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ANDERSON ECONOMIC GROUP

Economic Impact and Policy Analysis of Four Michigan Transportation Investment Proposals

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I. Executive Summary

Michigan's road quality is among the worst in the nation. Federal Highway Administration data shows that Michigan's roads rank 38th among the 50 states for quality.[1] Michigan's climate and the age of the state's transportation infrastructure contribute to the need for regular maintenance and repair. The condition of Michigan's roads presents a challenge to workers, employers, and policymakers seeking to support the state's economic development.

Michigan's roads are funded by state government, federal government, county road commissions, and cities and villages. The state government allocates the Michigan Transportation Fund (MTF) to state projects and local government entities. Inflation-adjusted MTF revenues have declined 18.8% since FY 2006. The main sources of revenue for the MTF are motor fuel and vehicle title and registration taxes.[2] The gasoline tax was raised to its current level of 19 cents per gallon in 1997. If it had risen with inflation its current level would be 27 cents per gallon. (This data is shown in greater detail in Table 4, "Real Changes to Motor Fuel Tax Rates 1945-1997," on page 14).

Over the last several years many in the state have identified the need for additional funding to meet Michigan's transportation needs:[3]

- In 2006, Anderson Economic Group prepared an infrastructure benchmarking report for the Michigan Legislature that documented the poor condition of the state's roads.
- In 2008, the Transportation Funding Task Force (a non-partisan group of business, transportation, and legislative leaders) prepared a report for Governor Granholm and the Michigan Legislature calling for significantly more investment in the state's transportation infrastructure.
- In 2010, Anderson Economic Group prepared a report commissioned by the Michigan Chamber of Commerce that estimated the economic impact of two funding scenarios identified in the 2008 Transportation Funding Task Force report.

1. Federal Highway Administration, 2008 International Roughness Index (IRI) ratings for state highways. IRI rating is derived from physical measurements of road surface roughness.
2. Michigan's two primary state fuel taxes are a 19 cents per gallon gasoline and a 15 cents per gallon diesel fuels tax. These are flat-rate taxes and do not shift with the price of fuel.
3. "Benchmarking For Success: A Comparison of State Infrastructure", AEG 2006; "Transportation Solutions: A Report on Michigan's Transportation Needs and Funding Alternatives," Michigan Transportation Task Force, 2008; "Michigan's Roads: The Cost of Doing Nothing and the Rewards of Bold Action," AEG 2010; "Michigan's Roads Crisis": A Report of the Work Group on Transportation Funding of the House of Representatives Transportation Committee, September 2011. Also see additional discussion in "Current Challenges in Road Funding" on page 13.

- In September 2011, the Work Group on Transportation Funding of the House of Representatives Transportation Committee prepared a report for the Michigan Legislature concluding that the state's road conditions are poor mainly because of insufficient funding.

These reports have had an important finding; Michigan needs more funding for roads. On October 26, 2011 Michigan Governor Rick Snyder released a "special message" on transportation in which he proposed an increase in annual funding for road construction and maintenance at the scale recommended by the House Work Group report.

PURPOSE OF REPORT

The purpose of this report is to:

- Review the current condition of Michigan's roads and the system the state uses to fund road construction and maintenance.
- Explain the elements of the proposal discussed in the Governor's "special message" on transportation infrastructure.
- Assess the impact on employment in the State of Michigan of one important aspect of the proposal: increasing state government expenditures on road construction and maintenance.
- Discuss several possible sources of funding for the proposed increase in expenditures.

SUMMARY OF GOVERNOR'S PROPOSAL

Governor Snyder's proposal includes the following elements:

1. Raising an additional $1.4 billion in transportation funding (increasing over the next 12 years approximately in line with inflation). An important element discussed but not specified by the governor is the source of the proposed additional $1.4 billion in funds for roads.[4]
2. Levying a new percentage wholesale fuel tax and eliminating existing per-gallon motor fuel excise taxes. The proposal is intended to be a revenue-neutral replacement in its first year.
3. Distributing MTF funds based on vehicle miles traveled. Currently, MTF funds are distributed in proportion to lane-miles based a formula established in 1951 by PA 51.
4. Allowing all counties to absorb their county road commissions.[5] Currently, all but two Michigan counties have their own road commission that is independent of other local government entities.

4. While the governor mentioned the possibility of relying on increased auto registration taxes as an example of where funding could come from on the scale he proposes, the special message did not outline a set of funding sources that raise $1.4 billion.
5. Elected county road commissions could be absorbed only with voter approval. Appointed road commissions could be absorbed at the county government's discretion.

5. Allowing counties, cities, and villages to levy a local vehicle registration tax, with voter approval, of up to $40 per vehicle annually for local transportation project use.

OVERVIEW OF APPROACH

In this report we first describe the state's current road funding system and examine trends in the level of funding available to maintain the state's roads. We then provide an overview and brief discussion of the elements of Governor Snyder's infrastructure proposals outlined in his October special message.

We then analyze the economic impact of the Governor's proposed increase in spending on road construction and maintenance starting in 2012.[6] As the governor has left the specific source of the new funds open for additional discussion, we constructed four scenarios for raising the proposed funds, making sure that each scenario is achievable within the current state constitution.

For each of these scenarios we estimate the *net* economic impact of the proposed increase in expenditures on road construction, considering both costs and benefits and considering substitution effects.

We also discuss further several potential sources of funding, including all sources analyzed in our economic impact analysis. Specifically, we discuss each source's basis in law and several advantages and disadvantages.

Limitations

This report evaluates the governor's proposal, focusing its quantitative analysis on the proposed $1.4 billion increase in annual spending on roads. We do not attempt to independently evaluate whether this amount is required to prevent further deterioration of the state's roads. We also do not attempt to quantify the benefits to Michigan industries of improved road conditions, though reduced repair costs and delays could improve the state's competitiveness in attracting and retaining business to the state by lowering certain operating costs. We also do not analyze the proposed change to the Act 51 road funding distribution formula.

See "Appendix A. Methodology" on page A-1.

6. The Governor and House Work Group have proposed increased revenue starting in 2012 and have presented several projections and figures showing the effects of their proposals in 2012. Since 2012 has already begun, it is clear that such plans could not be in place for a full calendar year in 2012. Nevertheless, to match the discussion by the governor and House Work Group, we present our analysis on a full-year basis for 2012 to illustrate the representative annual impact of the plans going forward.

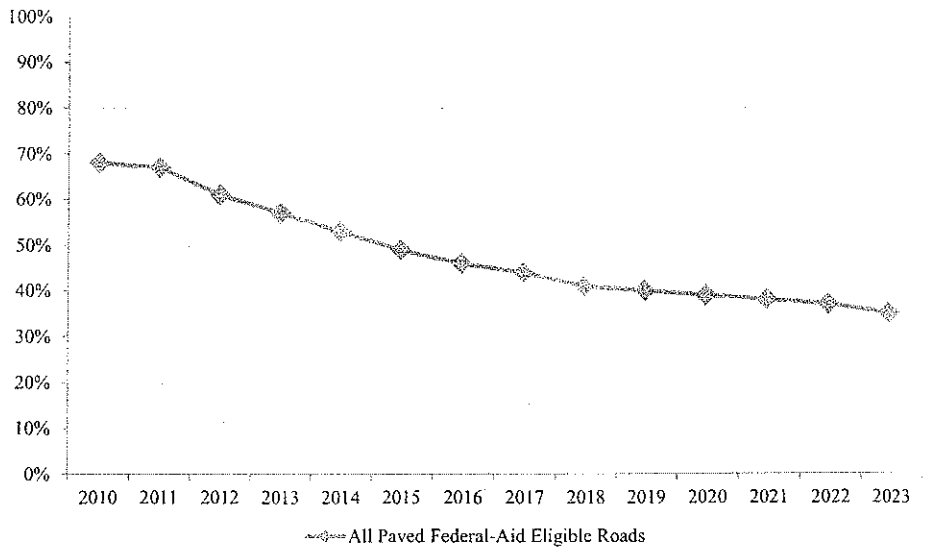
FINDINGS

1. Michigan's roads are in poor condition and are projected to worsen.

Over one-third of state roads are in "poor" condition, and less than 20% achieve a "good" quality rating.[7] Many of the roads with very low quality ratings are centered around traffic-heavy areas.[8] Furthermore, under current policy the condition of Michigan's roads is projected to worsen. For example, the Michigan Department of Transportation (MDOT) forecasts that by 2015 over 25% of Michigan's freeways and more than 60% of other paved roads will be in "poor" condition.

Figure 1 below shows the projected road quality as assessed by the Work Group on Transportation Funding of the House of Representatives Transportation Committee (House Work Group). If Michigan continues to fund roads using only the MTF funding sources in current law, the majority of Michigan's roads will be considered "poor."

FIGURE 1. Projected Michigan Road Quality Under Current Policy (Roads Rated "Good" or "Fair" under the PASER system)



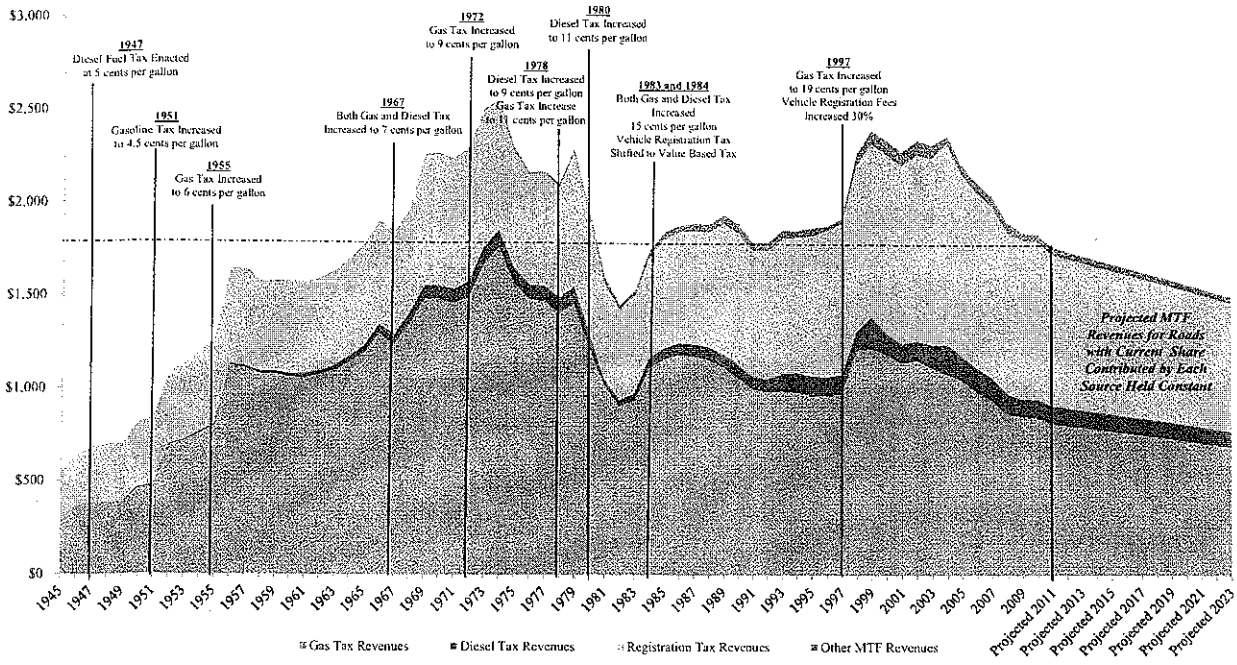
Source: A Special Message from Governor Rick Snyder: Reinventing Michigan's Infrastructure: Better Roads Drive Better Jobs
Analysis: Anderson Economic Group, LLC

7. MDOT presents this data using the PASER (Pavement Surface Evaluation and Rating) system, which uses physically-measured road surface quality. The system was created by the University of Wisconsin-Madison Transportation Information Center.
8. Road quality data are from the Asset Management Council of Michigan, Interactive Transportation Dashboard, http://www.mcgi.state.mi.us/MITRP/Data/PaserDashboard.aspx, accessed December 2011. For further discussion of the Asset Management Council see "Appendix A. Methodology" on page A-1.

2. One primary cause of the state's poor road condition is past under-investment. Road funding has fallen significantly since 1997 and will fall further under current policy.

The Transportation Funding Task Force and House Work Group reports both found that one important driver of the poor quality of Michigan's roads is the declining level of funds in the MTF. The current funding level is the lowest in decades, having fallen to a level first reached in 1967 and last seen in the early 1980's. It is projected to fall further under current policy. Figure 2 below shows a long term perspective on MTF revenues, from 1945 to 2010 (in inflation-adjusted 2010 U.S. Dollars), and the projected revenues between 2012 and 2023 under current policy.

FIGURE 2. MTF Revenues Allocated for Roads 1945-2010 (Thousands of 2010 U.S. Dollars)



Source: Citizens Research Council, MTF Source Revenue Data; Michigan Department of Treasury "Michigan's Motor Fuel and Registration Taxes FY 2003-2004; Bureau of Labor Statistics (CPI-U)
Analysis: Anderson Economic Group, LLC

3. The Governor has proposed additional state investment in roads starting at $1.4 billion annually. This would appear to halt the ongoing decline in the state's road conditions.

Governor Snyder echoed the conclusion of the House Work Group, proposing a $1.4 billion increase in annual road funds. The Work Group found that this level of additional investment would halt the continued decline in the quality of Michigan's roads, and, after several years, result in better pavement conditions throughout the state.

The Work Group identified two key reasons why it will take several years to turn the projected decline in road quality into improvement:

- There is a practical limit to how much road construction can take place at one time.[9]
- There is a back-log of "catch-up" maintenance.[10]

4. We have analyzed four example funding scenarios for raising the proposed $1.4 billion increase in annual road expenditures. Each of these scenarios would result in a net increase of over 11,000 jobs in the state.

We estimate the net impact of four scenarios that use different mixes of funding sources to provide the proposed $1.4 billion in additional funding. The scenarios are:

Scenario 1: Increasing vehicle registration taxes.

Scenario 2: Eliminating existing motor fuel excise taxes, replacing them with a wholesale tax on motor fuels that raises additional revenue.[11]

Scenario 3: Eliminating existing motor fuel excise taxes, replacing them with a wholesale tax on motor fuels that raises additional revenue and increased vehicle registration fees.

Scenario 4: Lowering existing motor fuel excise taxes to 10 cents per gallon, replacing the revenue and raising additional funds with a wholesale tax on motor fuels, and increasing vehicle registration fees.

We find that each of the four scenarios results in a net increase in employment in the state of over 11,000. This includes the almost 25,000 direct and indirect jobs created by sustained road construction and maintenance expenditures, as well approximately 14,000 jobs lost as household and business spending is reduced by tax increases.

At first it may seem counterintuitive that these scenarios result in a positive employment impact since they all involve spending funds that are taxed from households and businesses or diverted from other government expenditures. There are two main drivers of this result.

9. The House Work Group reports that MDOT's policy is that a maximum of 11% of freeways and between 17-19% of other major roads can be under construction at any time in order to maintain adequate mobility.
10. The House Work Group reports that in recent years roads have been maintained in their current condition using repair measures that wear out faster than other, more expensive approaches.
11. This differs from the Governor's existing proposal. This scenario would include a wholesale tax levied at a rate that is higher than would be required to achieve the proposed revenue-neutral change.

1. **Some funds would otherwise be spent out of state.** Some of the funds raised by increases in taxes and fees would have been spent outside the state by households and businesses if not for the policy changes in the scenario, whereas they are all spent in the state if they are used on road construction.
2. **Some expenditures have different "multiplier" effects.** All of these scenarios involve changing the amount of funds expended by households, businesses, and state and local government (including spending on road construction). The impact of these changes on employment as this money circulates in the economy (the "multiplier" effect) is different for each sector. The factors that affect a sector's employment multiplier include how labor-intensive the task is and how much the industry's supply chain is clustered in the state.

It is also important to note that the primary purpose of increased investment in roads is to build long-lived assets that improve the quality of life and business climate in the state, not to create construction jobs.

Our analysis is discussed in detail in "Economic Impact of Four Transportation Infrastructure Funding Scenarios" on page 22 and "Appendix A. Methodology" on page A-1.

5. Each identified funding option has advantages and disadvantages.

Each of the potential funding sources that we discuss in this report have advantages and disadvantages. Table 1 summarizes these.

TABLE 1. Summary of Advantages and Disadvantages of Example Funding Sources

	Advantages	Disadvantages
Per-gallon excise taxes on motor fuels	• Collects revenue in proportion to road use. • Not affected by volatility of fuel prices. • Paid in part by out-of-state drivers.	• Revenue does not rise with inflation.
Percentage wholesale tax on motor fuels[a]	• Allows motor fuel revenue to rise with inflation. • Collects revenue in proportion to road use. • Paid in part by out-of-state drivers.	• Affected by volatility of fuel prices.
Per-vehicle registration taxes	• Collects revenue from most users of road system, including owners of vehicles that bypass the motor fuel tax (e.g. electric vehicles). • Increases with inflation. • Tax deductible on Federal tax returns.	• Amount collected not in proportion to road use. • Not paid by out-of-state drivers.

Source: Anderson Economic Group LLC

a. Governor Snyder has proposed a *revenue neutral* replacement of existing motor fuel excise taxes with a wholesale tax on fuels. This replacement tax could also be used as a source of additional funds beyond what would be raised under current law.

In general, percentage-based taxes (such as the wholesale fuel tax) improve the system's ability to provide consistent funding in the face of inflation, but increase the system's exposure to swings in the market price of fuels. Vehicle registration taxes address somewhat the potential long-run trend of consumers purchasing vehicles, such as hybrids and electric, that bypass the motor fuel tax, but do not charge road users in proportion with their use.

See "Transportation Infrastructure Funding Options" on page 30.

6. *Another frequently-discussed funding source is diverting revenue from sales tax collected on purchases of motor fuel. This idea has several disadvantages compared to the other options discussed in this report.*

In addition to the statutory funding sources we examined in the four funding scenarios, some policymakers have considered the possibility of diverting a portion of the state's sales and use taxes, namely those currently paid on purchases of motor fuels, from their current uses to the MTF. This approach has several disadvantages compared to the other potential funding scenarios described in this report, including:

- It would require an amendment to Michigan's Constitution, further delaying action on Michigan's roads.
- It would not, on its own, raise the amount of funds proposed by the House Work Group and Governor. We estimate that approximately $1 billion would be raised by this option, which is less than the $1.4 billion proposed. The state government would need to raise still more funds by other means if it wished to achieve the governor's targeted funding level.
- The economic impact is likely lower and has much greater uncertainty than the other scenarios analyzed in this report. This is because the funds would be diverted from the General Fund and School Aid Fund on a scale (over $1 billion combined annually) that would make the reactions by state and local governments and school districts difficult to predict. Such reactions could include reducing expenses through layoffs, reducing compensation, reducing transfers to program beneficiaries, outsourcing certain activities to private contractors, restructuring operations, or increasing taxes.

See "Economic Impact of Four Transportation Infrastructure Funding Scenarios" on page 22 for further discussion.

ABOUT ANDERSON ECONOMIC GROUP

Anderson Economic Group is a research and consulting firm specializing in economics, finance, business valuation, and industry analysis. The firm was founded in 1996, and has offices in East Lansing, Michigan and Chicago, Illinois. See "Appendix B: About AEG" on page B-1.

II. Michigan Transportation Infrastructure and Overview of Proposed Policy Change

Michigan's road quality is among the worst in the nation. Federal Highway Administration data shows that Michigan's roads rank 38th among the 50 states for road quality.[12] Road quality deterioration has occurred in Michigan mainly because of insufficient funding for transportation infrastructure and inefficient allocation of those funds.

On October 26, 2011 Michigan Governor Rick Snyder released a "special message" on transportation. In this message he highlighted possible policy changes intended to make Michigan's transportation infrastructure funding more efficient and greater. The message not only referenced policy changes but also the rationale behind them. In this section we summarize the following:

- Current condition of Michigan's roads
- Michigan's existing road funding system
- Challenges the current system presents
- Governor Snyder's proposals for addressing the current challenges

CURRENT CONDITION OF MICHIGAN'S ROADS

Michigan's motorists are all too aware of the poor and declining road quality in the state.[13] With over one-third of Federal-Aid-eligible state roads in "poor" condition and less than 20% passing a "good" quality rating, Michigan's transportation infrastructure is on a downward slope.[14] If the current transportation funding schedule continues, by 2015 MDOT forecasts that over 25% of Michigan's freeways and more than 60% of other paved roads will be considered in "poor condition".[15]

Figure 3 on page 10 shows the projected road quality as assessed by the Work Group on Transportation Funding of the House of Representatives Transportation Committee. If Michigan continues to fund roads using the current MTF strategy the majority of Michigan's roads will be considered "poor".

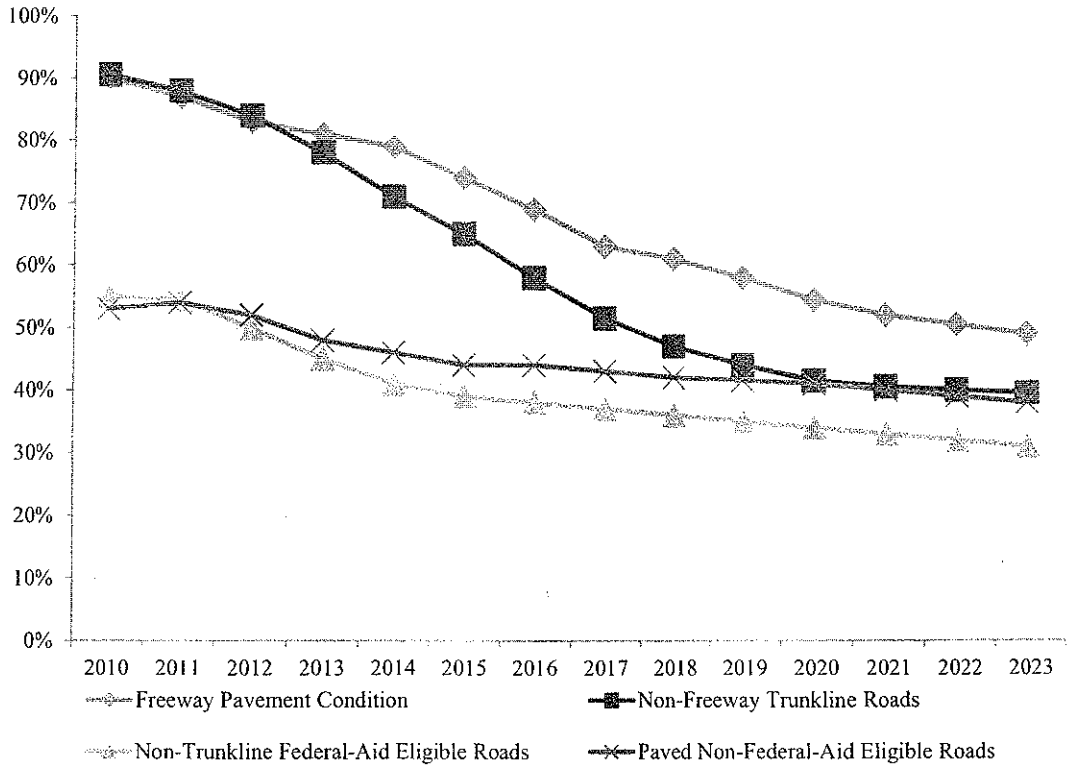
12. FHWA, 2008 IRI ratings for state highways.

13. The Asset Management Council sponsors an interactive map on their website. Using this map, tax-payers can see exactly which roads are rated under each quality metric. This map is further evidence of Michigan's crumbling transportation infrastructure. See Asset Management Council Interactive Map at http://www.mcgi.state.mi.us/MITRP/Data/paserMap.aspx.

14. Quality ratings are measured using the PASER rating system. PASER stands for the Pavement Surface Evaluation and Rating System. This method of evaluating roads was created by the University of Wisconsin-Madison Transportation Information Center. It incorporates metrics that measure surface quality.

15. Asset Management Council, see the interactive Transportation Dashboard here: http://www.mcgi.state.mi.us/MITRP/Data/PaserDashboard.aspx. Accessed December 2011.

FIGURE 3. **Michigan Road Quality Projection (Roads Considered "Good" or "Fair" under the PASER system)**



Source: Work Group on Transportation Funding of the House of Representative Transportation Committee
Analysis: Anderson Economic Group, LLC

The decline in road quality has been more noticeable in recent years. In 2004 only about 12% of Michigan's roads were in poor condition according to the Michigan Transportation Asset Management Council Dashboard.[16] This means that in the past six years the percentage of roads rated "poor" has more than doubled. Many of the roads with very low quality ratings are centered around traffic heavy areas.

The quality of Michigan's roads is low for several reasons, two of which are connected to the level of funding and how those funds are distributed. First, funds in the Michigan Transportation Fund (MTF) which is the major source of financing for Michigan's roads, have been declining in both real and nominal terms in the past decade. This means that less money is available for roads and those funds do not stretch far enough as construction costs increase. Second, MTF funds are allocated based on a formula which allocates funds to jurisdic-

16. Asset Management Council, see the interactive Transportation Dashboard here: http://www.mcgi.state.mi.us/MITRP/Data/PaserDashboard.aspx. Accessed December 2011.

tions in charge of roads based primarily on the number of route miles in that jurisdiction not how frequently the roads are used or need maintenance attention.[17] In the following sections we will discuss these topics and how the current funding scheme for Michigan's transportation infrastructure has contributed to declining road quality.

MICHIGAN'S ROAD FUNDING SYSTEM

Michigan's trunkline system includes all interstate highways, US-, and M-roads. These provide the greatest connections between Michigan's communities and other states.

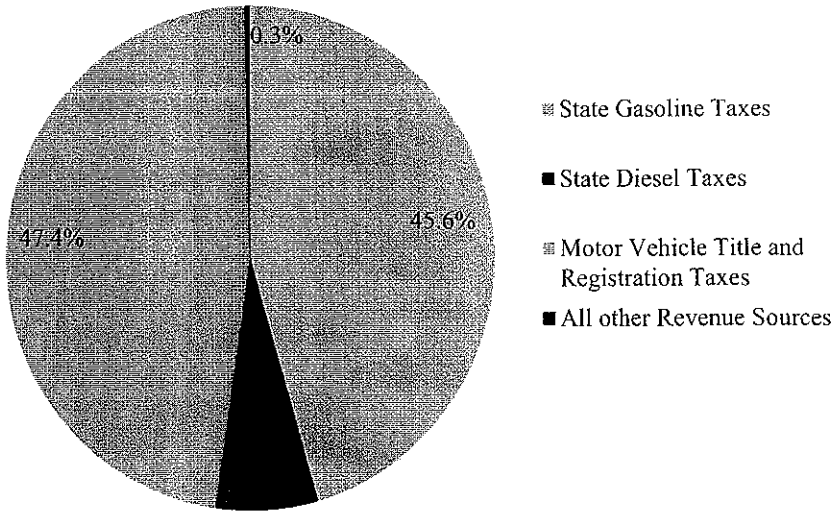
Michigan's Transportation Fund. Michigan's roads are funded by state government, federal government, counties, and cities and villages. The main source of funding for these entities is the Michigan Transportation Fund (MTF). The MTF is directed by the state government which allocates funding to the state trunkline fund, county road commissions, and local government entities. Trunkline road maintenance is funded by a combination of state and federal funds that are controlled by the state government. The other roads in Michigan's transportation system are run by counties, cities, and villages and funded by contributions from the MTF along with any contribution the county or municipality can make.

The MTF was established by Act 51 of 1951 (Act 51). The MTF is the primary fund for collecting and allocating transportation revenues. The act mandates how funds are distributed between entities. The main sources of revenue for the MTF are motor vehicle title and registration taxes (47.4%) and gasoline and diesel fuel tax revenues (45.6% and 6.6% respectively).[18] Figure 4 on page 12 shows the breakdown of each funding source for the MTF projected for 2011. The MTF does not provide funds to nor collect from the state's General Fund.

17. The formula for allocating MTF revenues is primarily based on route miles. In addition to route miles the formula includes the population as well as the number of vehicle registrations in each area.

18. Michigan's two primary state fuel taxes are motor fuel taxes on gasoline diesel fuels. The gasoline tax is currently 19 cents per gallon and the diesel tax is 15 cents per gallon. These are fixed per gallon taxes which do not change with the price of gasoline.

FIGURE 4. MTF Revenue by Fund Source, FY 2011 Projection



Source: House Fiscal Agency, MTF Fund Revenue Projection FY 2011
Analysis: Anderson Economic Group, LLC

Table 2 below shows MTF revenues between FY 2006 and the projection for 2012. Real MTF revenues have fallen 18.8% since 2006. The 2012 projection shows a slight increase from Projected FY 2011, but the true collected value is not yet known.

TABLE 2. MTF, Sources of Revenue FY 2006-2011 (Thousands of 2011 U.S. Dollars)

Revenue Source	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011-Projection	FY 2012-Projection	% Change 2006-2012
$.19/gal Gasoline Tax	$1,051,216	$989,730	$925,262	$888,314	$892,158	$839,000	$844,000	-19.7%
Diesel Fuel Taxes $.15/gal	$172,375	$161,063	$152,704	$123,515	$127,273	$122,000	$124,000	-28.1%
Vehicle Title & Registration Taxes	$1,042,606	$1,016,746	$975,249	$915,519	$922,484	$872,875	$878,875	-15.7%
All other Revenues	$16,589	$9,109	$6,415	$3,592	$8,673	$6,350	$6,535	-60.6%
Total	**$2,282,787**	**$2,176,648**	**$2,059,630**	**$1,930,940**	**$1,950,589**	**$1,840,225**	**$1,853,410**	**-18.8%**

Source: House Fiscal Agency, MTF Source and Distribution FY 1997-2012, "All other Revenue" includes the liquid petroleum tax, interest, and other revenues.
Analysis: Anderson Economic Group, LLC 2011

MTF Distribution. Funds in the MTF are distributed to the state Trunkline fund, county road commissions, as well as cities and villages. Act 51 mandates the amounts allocated to each entity based on the formula created in the original

1951 legislation.[19] Currently, the State Trunkline system and Michigan's 83 county road agencies receive the same amount of funding from the MTF annually (39.1% of the reminder after funds are allocated to administration, public transport, and rail). Michigan's 533 incorporated cities and villages receive 21.8% of the remaining MTF dollars and are responsible for city/village streets.

Act 51 stipulates that funds be allocated to each entity based primarily on the route miles of roads under their jurisdiction. This means that the each entity is given funding proportional to the number of miles of road they control. This formula does not consider how frequently roads are used or the annual amount of traffic they see. Table 3 below shows the number of route miles and the annual vehicle miles driven for the state trunkline, counties, and locally controlled roads.[20] State trunkline roads have twice as many vehicle miles traveled as county roads. However, both of these road system receive the same amount of funding from the MTF.

TABLE 3. State Road System Route Miles, Miles Traveled, and MTF Distribution by Entity

Legal System	Route Miles	% of State Total Route Miles	Annual Vehicle Miles Traveled (Millions)	% of State Total Annual Vehicle Miles Traveled	2010 MTF Balance Distributed (Millions)	% MTF Allocation[a]
State Trunklines	9,725	8.1%	49,986	54.6%	$513.3	38.9%
County Roads	89,174	74.7%	26,206	28.6%	$511.9	38.8%
City and Village Roads	20,500	17.2%	15,423	16.8%	$293.4	22.3%
State Total	**119,399**	**100%**	**91,615**	**100%**	**$1,318.6**	**100%**

Source: Highway Performance Monitoring System, MDOT Sufficiency Report, and FY 2010 State Transportation Tax Revenues and Distribution (as cited in "Michigan's Roads Crisis": A Report of the Work Group on Transportation Funding of the House of Representatives Transportation Committee, September 2011.)
Analysis: Anderson Economic Group, LLC

a. Allocations set by Act 51 are meant to be 39.1%, 39.1%, and 21.8% respectively. These are not the exact reality based on jurisdictional transfers between the three legal systems.

CURRENT CHALLENGES IN ROAD FUNDING

Michigan's roads have eroded in quality and become progressively worse in recent years.[21] Lack of adequate funding for roads that need maintenance is one of the main reasons for this.

19. The Act 51 formula has been amended four times since its enactment. The formula was originally 44%/37%/19% for MDOT, Counties, and Cities and Villages, respectively. The current formula was enacted in 1985.

20. Route miles is defined as the sum of all road lane miles within a jurisdiction's legal area. Annual Vehicle Miles Traveled is a measure of the annual use of each type of road.

21. Anderson Economic Group, "Michigan's Roads: The Cost of Doing Nothing and the Rewards of Bold Action," 2010, and Michigan Asset Management Council.

Insufficient funds. The current funding level of the MTF is inadequate to meet the state's infrastructure needs. Table 2, "MTF, Sources of Revenue FY 2006-2011 (Thousands of 2011 U.S. Dollars)," on page 12 shows that total real revenues have declined 18.8% since FY 2006. Currently, 45.6% of the funding comes from gasoline tax revenues, 6.6% from diesel tax revenues, and 47.4% comes from vehicle registration taxes. The remaining 0.3% is from liquid petroleum taxes, interest, and other sources. Starting in the 2006-2007 fiscal year, vehicle title and registration taxes surpassed gasoline taxes as the largest portion of revenue for the transportation fund.

Table 4 below shows the real and nominal changes to Michigan's motor fuel tax rates since 1947. Though the nominal rate has increased, the real tax rate has declined dramatically since the mid-1900s. This is because Michigan's motor fuel taxes have never been indexed to inflation. As construction costs and other costs grow each year, the revenues gathered by the MTF have lower purchasing power.

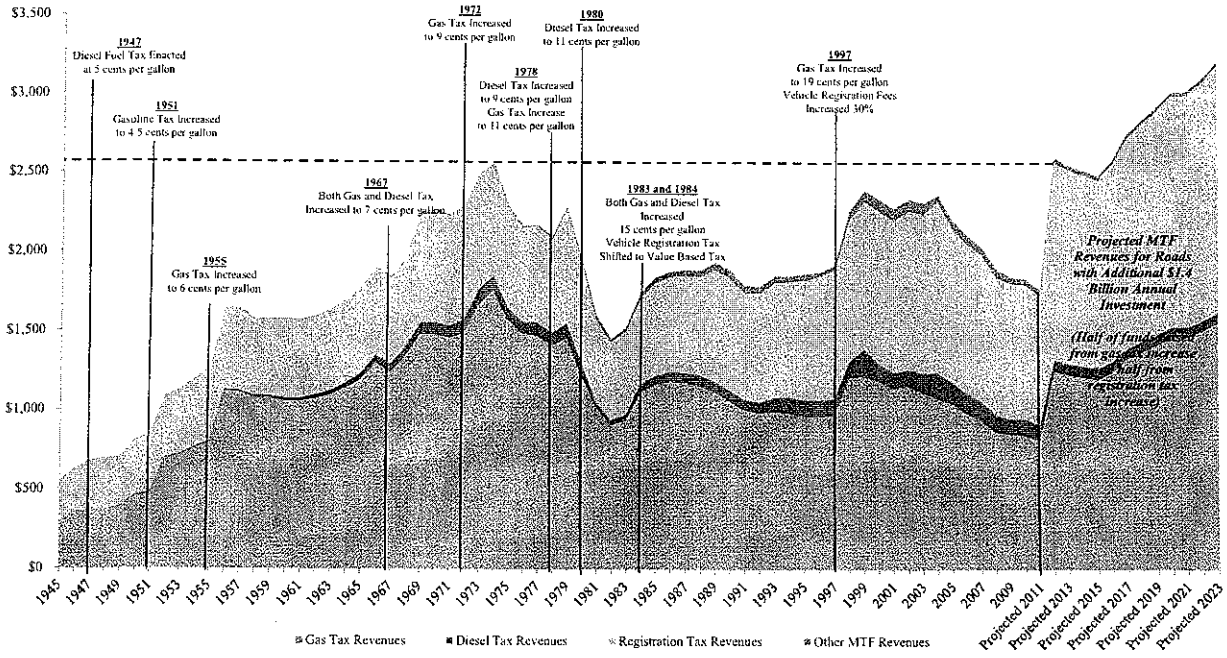
TABLE 4. **Real Changes to Motor Fuel Tax Rates 1945-1997**

Year	Motor Fuel	Nominal Tax Rate	Real Tax Rate 2011 U.S Dollars
1947	Diesel Tax Enacted	5 cents per gallon	51 cents per gallon
1951	Gas Tax Increased	4.5 cents per gallon	39 cents per gallon
1955	Gas Tax Increased	6 cents per gallon	51 cents per gallon
1967	Gas and Diesel Tax Increased	7 cents per gallon	47 cents per gallon
1972	Gas Tax Increased	9 cents per gallon	49 cents per gallon
1978	Gas and Diesel Tax Increased	Gas-11 cents per gallon	Gas-38 cents per gallon
		Diesel-9 cents per gallon	Diesel -31 cents per gallon
1980	Diesel Tax Increased	11 cents per gallon	30 cents per gallon
1983-1984	Gas and Diesel Tax Increased	15 cents per gallon	33 cents per gallon
1997	Gas Tax Increased	19 cents per gallon	27 cents per gallon

Source: Michigan Department of Treasury, "Michigan's Motor Fuel and Registration Taxes FY 2003-2004".
Analysis: Anderson Economic Group, LLC

Figure 5 on page 15 shows a long term perspective on MTF revenues, from 1945 to 2010 (in inflation-adjusted 2010 U.S. Dollars), and the projected revenues between 2012 and 2023 if additional funds are raised as proposed by the Governor. Highlighted in the graph are changes to Michigan's motor fuel tax rates and registration taxes. As shown in Table 2, "MTF, Sources of Revenue FY 2006-2011 (Thousands of 2011 U.S. Dollars)," on page 12 and in Figure 5 on page 15, gasoline tax and registration tax revenues make-up the majority of MTF funds. The red line representing revenues from diesel fuel has stayed roughly the same since the diesel tax was enacted in 1955.

FIGURE 5. MTF Revenues Allocated for Roads 1945-2010 (Thousands of 2010 U.S. Dollars)



Source: Citizens Research Council, MTF Source Revenue Data; Michigan Department of Treasury "Michigan's Motor Fuel and Registration Taxes FY 2003-2004; Bureau of Labor Statistics (CPI-U)
Analysis: Anderson Economic Group, LLC

The figure above not only highlights the size of each revenue source but it also shows how MTF revenues have grown since the mid-20th century. The current level of funding is similar to the real dollars in the MTF throughout the 1960s prior to the 1967 motor fuel tax increase, and throughout the 1980s and 1990s prior to the 1997 gasoline tax increase. See Figure 2, "MTF Revenues Allocated for Roads 1945-2010 (Thousands of 2010 U.S. Dollars)," on page 5. The downward sloping curve between 1999 and the current year illustrates the decline of revenue generated from Michigan fuel taxes. The dashed horizontal line shows that projected MTF revenues (with an additional $1.4 billion) are similar to the real value of MTF funds available in the early 1970s.

Since 2007 revenues from motor vehicle registrations have surpassed gasoline taxes as the largest contributor to the MTF. The shift in major revenue source occurred because Michigan's gasoline tax is a fixed, flat-rate, per-gallon tax rather than one that adjusts with inflation or rises with the price of gas. On the other hand, vehicle registration taxes are calculated as a percentage of a vehicle's value when new. This measurement declines by 10% each year for the first three years of vehicle ownership to account for vehicle depreciation.[22] Overall

22. Registration taxes are levied on all vehicles. If a Michigan resident purchases a used vehicle their registration tax is still assessed on the value of the vehicle when new (less the 10% annual deduction for the first three years of a vehicle's life).

revenues have declined as fuel-efficient technology has become more popular in vehicles and as people have chosen to drive fewer miles. Similar to any good in the market; as the price of gasoline has rises, consumers purchase less of it.

One key reason for lower revenues is that the motor fuel excise taxes that are collected have lost purchasing power as discussed using Figure 5 on page 15 and Table 4 on page 14. A fixed, flat-rate, per gallon gas tax contributes to lost purchasing power because it does not grow with inflation. The cost of building and maintaining roads has grown, yet the gas tax is not indexed to inflation to match rising construction costs. Michigan last updated its fuel taxes in 1997 amending the Motor Fuel Tax Act to increase the gas tax from 15 cents to 19 cents per gallon for gasoline and kept the 15 cents per gallon for diesel stable.[23] The flat-rate gasoline tax has not changed in well over a decade and the diesel tax has not changed since 1984. If Michigan had instituted an inflation adjusting gas tax in 1997, rather than a flat-rate gas tax, drivers would be paying 27 cents per gallon now rather than the current 19 cents per gallon.[24]

More expensive if we wait. Michigan's road system is facing a shortfall of necessary funds to keep roads in adequate condition. Waiting longer to generate these funds may cost more than paying the price now. This shortfall is caused by two main factors; many of the three to seven year maintenance requirements are coming due at the same time; and the constant decline in MTF has not been able to fully maintain the state's roads.

In many cases for individual roads, the longer maintenance is put off into the future, the more expensive it will become. As road quality deteriorates the necessary funds to fix them increases because conditions worsen and projects become much more expensive. For example, if a road has cracks that need to be filled in year two of its life but this work is delayed, in coming years instead of going back to fill new cracks that form there might be large potholes or other maintenance needs due to the initial unfilled cracks. This may require larger amounts of funding and time to complete than the combined cost of two stages of filling cracks. Delaying a necessary maintenance step reduces the life of Michigan's roads and increases the maintenance costs. The key concept is that short term or more temporary repairs can sometimes allow greater structural deterioration to accumulate. This then may require a more expensive reconstruction. As a result, the life-cycle cost of a road can sometimes be reduced by pursuing repair techniques in the short run that appear to be more expensive. This is just one of many examples of what has happened to Michigan's roads in light of funding shortages and inefficient allocation of funds.

23. Public Act 403 of 2000.

24. Applying Bureau of Labor Statistics CPI-U from 1997 to 2011 shows that 19 cents in 1997 is equivalent to 27 cents in 2011. Also in Citizens Research Council, "What If Michigan Had Enacted a Price Based Gasoline Tax in 1997?", CRC Notes, November 2011.

The cost is not only monetary for large road maintenance projects. As construction projects become more complicated and long, traffic is impeded for longer periods of time as well. This forces Michigan's road users to find alternative routes causing additional traffic on non-construction thoroughfares. MDOT has estimated that about 11% of interstates and 17%-19% of other roads can be under construction at a given time without excessive disruption to commerce. This limits the ability to improve infrastructure regardless of how much funding is available.

Efficient funding allocation. The existing road funding system is "inefficient" in that even if paired with increased funding, it does not apply funds based on where they would most improve the overall condition of the state's roads. There are at least two possible sources of inefficiency. First, road agencies in Michigan are not all required to use the same methods to assess road quality and maintenance needs. This means that some agencies may not be using funds in the most efficient manner, though a comprehensive inventory of road agency management principles is beyond the scope of this report. Second, funds are allocated to each road agency based on the number of route miles in their jurisdiction with little consideration for how heavily roads are used. While population and vehicle registrations are part of the funding formula, traffic due to commuters and business trade is not considered. If this were changed, the quality of the most heavily used roads in Michigan would likely increase.

Michigan's Trunkline system employs an asset management system for road maintenance. This means that the state tries to get "the right fix, in the right place, at the right time" with the overall goal of maximizing a road's life while also reducing the total life-cycle cost.[25] However, it is not always possible to follow this plan 100% of the time. Some roads may need to take precedence over others for major fixes. If funding is lower than what it would need to be to maintain all roads optimally, priorities change to the most high traffic trunkline areas which means that roads in the poorest condition must be overlooked until funding increases to meet their maintenance needs. The asset management system is defined by this act as an "ongoing process of maintaining, upgrading, and operating physical assets cost-effectively, based on continuous physical inventory and condition assessment."

The Asset Management Council is required by Act 51 to provide asset management training to local road agency officials.[26] While local agencies are required to use asset management principles for road projects, each local agency has the freedom to determine its own principles. As a result, there may be variation in practices that could provide room for improvements in local implementation.

25. "Michigan's Roads Crisis": A Report of the Work Group on Transportation Funding of the House of Representatives Transportation Committee, September 2011.

26. Act 51 of 1951, Section 1g.

The other main efficiency issue is that Act 51 mandates that MTF funds be distributed primarily based on road mileage in each jurisdiction. This means that the number of route miles an entity has is the basis of funding rather than how frequently they are used. This allocation system has contributed to the decline in road quality, especially around urban areas and for rural roads that are major thoroughfares.[27] See "Current Condition of Michigan's Roads" on page 9 for further discussion.

GOVERNOR SNYDER'S INFRASTRUCTURE PROPOSAL

In his special message on Transportation, Governor Snyder noted several policy changes that would address current challenges in our funding structure. He also put forth options for how to best allocate and make efficient use of transportation funds. Below we outline Governor Snyder's main proposals, the rationale behind them, and whether or not there is legislation currently in the Michigan legislature addressing the issue. The governor did not outline a specific mechanism for funding his increased expenditure proposal. Please see "Transportation Infrastructure Funding Options" on page 30 for specific details on how Michigan could raise additional funds for the MTF including examples given by Governor Snyder.

Funding Related Proposals

Governor Snyder noted two major funding changes for MTF revenues and their sources. These include:

1. An additional $1.4 billion in transportation funding (increasing over the next 11 years).
2. Levying a percentage wholesale fuel tax and eliminating per-gallon motor fuel taxes.

Additional $1.4 billion for MTF. Governor Snyder's first proposal asks for an additional $1.4 billion in transportation funding each year. The rationale for this amount can be found in "Michigan's Roads Crisis", a report issued by a bipartisan work group of the Michigan House of Representatives Transportation Committee.[28] According to the study, if Michigan invests $1.4 billion additional

27. See Anderson Economic Group, "Michigan's Roads: The Cost of Doing Nothing and the Rewards of Bold Action," 2010 for more detail on the quality of Michigan's roads.

28. The House Work Group report and Governor Snyder show data that implies an MTF revenue increase beginning in 2012. There is no legislation currently in the Michigan Legislature on this topic. If legislation is presented and passed any fee or tax changes made have a constitutionally required 90 day hold until changes can take effect. Article IV Section 27 of the Michigan Constitution states: "No act shall take effect until the expiration of 90 days from the end of the session at which it was passed, but the Legislature may give immediate effect to acts by a two-thirds vote of the members elected and serving in each house." We will continue the discussion of funding as if the change were to occur beginning in 2012. However, bear in mind the above requirement.

dollars in each of the next three years the quality of our roads will not decrease any further. The study also indicates that road quality will increase over time if the additional investment is made. The report focuses on increasing the quality of Michigan's roads. With the additional investment, Michigan's transportation infrastructure will simply not deteriorate further for the next few years. After that however, additional investment will yield positive results and Michigan's overall road quality will increase. The fourth chapter of this report, "Transportation Infrastructure Funding Options" on page 30, outline mechanisms for raising an additional $1.4 billion for the MTF.

Eliminate per-gallon tax, levy wholesale tax. The second suggestion for funding is to eliminate the per-gallon gasoline and diesel fuel taxes and levy a percentage-based wholesale fuel tax in its place. There are two main motives for this suggestion. Economically speaking, most people prefer to have their taxes hidden. This means that they accept paying a tax more frequently if it does not appear to be an additional charge. In the case of motor fuel taxes, changing from per-gallon to a wholesale percentage may not change the actual price at the pump for drivers. A business may or may not choose to push their additional tax off onto customers. However, the change may alter consumer sentiment because drivers will know that the 19 cents or 15 cents per gallon for gasoline and diesel no longer exists and that fuel companies are responsible for passing off their tax costs to consumers.

The second motive behind this tax change is that Michigan's per-gallon tax is not indexed to inflation. It does not increase as prices increase which has contributed to lower revenues for the MTF. Over time, inflation has eroded the ability of this flat tax to fund the repair of Michigan's roads. If adjusted for inflation, the gas tax would be 27 cents per gallon, rather than the current 19 cents per gallon. Together the gas and fuel tax currently contribute just over half of the revenue for the Michigan Transportation Fund (MTF).A percentage tax would yield more revenue as prices increase. But if prices drop, revenue drops as well. As described in "Transportation Infrastructure Funding Options" on page 30, the state has not increased its fuel taxes since 1997.

Efficiency Related Proposals

In his address, Governor Snyder noted many issues with the current transportation funding and service system that could be fixed with changes to current law. Many of the issues he noted were addressed previously in this report and in "Current Challenges in Road Funding" on page 13. There are four main changes to how MTF funds are used and allocated, along with a handful of other suggestions.

1. Distribute MTF funds based on vehicle miles traveled rather than route miles.
2. Allow all counties to absorb their county road commission based on voter approval.

3. Update Act 51 of 1951 to remove cities and villages from the funding model that receive less than $50,000 annually from the MTF.
4. Allow local agencies to levy a local vehicle registration tax of up to $40 per vehicle annually for local transportation project use.

Vehicle miles traveled. Currently, Act 51 mandates that MTF dollars be allocated to agencies based on mileage. This translates to using the number of route miles within a given jurisdiction in order to allocate MTF dollars. Table 3, "State Road System Route Miles, Miles Traveled, and MTF Distribution by Entity," on page 13 shows the amount of route miles in each system and the percentage of the MTF given. The governor has proposed that we change the allocation to be based on annual vehicle miles traveled. This suggestion is made in the House Work Group report. Senate Bill 2 of 2011(which is currently in the Senate Transportation Committee) proposes the exact language change to Act 51 that is necessary to change how MTF funds are apportioned. The rationale for this is that too few MTF dollars are going to the most heavily used roads in the state. Table 3 on page 13 also shows the vehicle miles traveled for each legal entity as outlined in Act 51. It is clear that route miles and vehicle miles traveled do not correlate. Changing the allocation formula would allow MTF dollars to be directed based on road use.

County road commissions. Michigan is the only state that has independent road commissions for almost every county.[29] There are 83 county road entities in Michigan, 81 of which are separate from their county government. The current laws for road commissions and county commissions are outlined in Public 283 of 1909 and Public Act 156 of 1851. These laws provide powers to county road agencies to use funds for transportation projects, and allow county commissions to absorb the road commission upon voter approval as long as the county is home to more than 750,000 residents. The Governor suggested that Michigan allow all counties to absorb their county road commission and not base the shift of power on voter approval unless road commissioners are directly elected by the public. House Bills 5125 and 5126 of 2011 suggest this exact change. The rationale for this is that approvals from a county commission on top of a road commission adds an additional layer of bureaucracy for transportation projects. If a county commission can do an efficient job of allocating the MTF dollars given to them then there is no need for a county road commission. Some might argue that larger counties need a separate commission for roads simply due to size. Counter to this argument is the situation of Macomb and Wayne counties, which are two of Michigan's largest. Both Macomb and Wayne counties have voted to eliminate their county road commissions to reduce administration costs.

29. Governor Snyder Special Message on Transportation, October 26, 2011.

Entities with less than $50,000 MTF dollars annually. Over 100 cities and villages in Michigan receive less than $50,000 from the MTF each year. Most of these entities are not the major authority for their community's roads either. More often the county is in charge. Governor Snyder suggests that the state update Act 51 to eliminate funding for these smaller cities and villages and allocate the funds to the county instead. His rationale for this is similar to that for dissolving county road commissions.This would remove a layer of administration that may not be necessary, nor efficient, for making transportation dollars most effective where they are needed.

Local-option vehicle registration taxes. One method of raising additional revenue for counties, cities, and villages, is to allow a local option motor vehicle title and registration tax. The Governor has proposed to allow a levy of up to $40 per vehicle annually at the local level contingent on voter approval. These would not be funds going to the MTF, but would be specifically for local transportation project use. The rationale for this option is that it would allow more flexible spending at the local level.

Policy elements not specified by Governor's proposal

There are several aspects of the proposed reforms that are important for estimating economic impact but were not specified or predicted by the governor, leaving them in the control of the state legislature or local governments. These include:

- The source of the proposed additional spending on road construction and maintenance.
- The extent to which local governments would use their newly-granted powers to consolidate road commissions and county governments and to levy local option vehicle registration taxes.
- The effect on road conditions of allocating MTF funds by vehicle miles traveled rather than road miles.

Our analysis does not estimate the extent or effects of any increase local expenditures on roads, though this would likely amplify the effects of state-level policy.

We consider several options for funding sources in the next chapters:

- Section III, "Economic Impact of Four Transportation Infrastructure Funding Scenarios" on page 22 outlines four funding scenarios that use different combinations of these funding sources then discusses our economic impact analysis of each scenario.
- Section IV, "Transportation Infrastructure Funding Options" on page 30 identifies three plausible funding sources that could be used in combination to raise the proposed funds, including sources mentioned as example possibilities by the governor.

III. Economic Impact of Four Transportation Infrastructure Funding Scenarios

As discussed in "Michigan Transportation Infrastructure and Overview of Proposed Policy Change" on page 9, Governor Snyder's special message on transportation proposes additional investment to repair and better maintain Michigan's road starting at $1.4 billion annually. This section summarizes our analysis the economic impact of four scenarios, each using a different mix of taxes to raise the proposed funds.

Constitutional and other policy aspects of each of the proposed funding sources is discussed in further detail in the section following this one, "Transportation Infrastructure Funding Options" on page 30.

Other benefits of improved road quality, including cost and safety benefits, is discussed in the final section of this report, "Additional Benefits of Investing in Transportation Infrastructure" on page 39.

SCOPE OF ANALYSIS

The scope of this employment impact is limited to the effects of expenditures made through the Michigan Transportation Fund (MTF). This analysis does not include federal funds awarded as matching dollars or expenditures made by specific municipal entities in Michigan.[30] We treat each additional taxpayer dollar spent on transportation equally, regardless of which entity it may go through.

FOUR EXAMPLE FUNDING SCENARIOS

This section describes the four scenarios for which we have evaluated economic impact. All of the example scenarios have two components:

1. Replacing the current fuel excise tax with a wholesale tax.
2. An example set of policy changes that would make available $1.4 billion more than current law.

The four example scenarios, as identified by their method of raising the additional $1.4 billion are:

Scenario 1: Increase Registration Taxes. In this scenario the sole source of additional funds is motor vehicle registration tax revenues. The average registration tax paid in FY 2010 was $112. If all additional funding came from registration taxes they would increase on average about 158%.[31] This scenario

30. This analysis does not include the impact of potential changes in behavior due to shifts in taxation levels. We also do not address the signalling effects of road quality for business location decisions.

31. This analysis assumes that the same number of vehicles will be registered in Michigan in 2012 as in 2010.

assumes that the current 19 cents per gallon gasoline tax and the 15 cents per gallon diesel tax have been shifted to a revenue neutral 6.98% wholesale tax.[32]

Scenario 2: Increase Motor Fuel Tax Revenue. The governor has proposed a *revenue-neutral* policy change, switching from flat per-gallon motor fuel excise taxes on gasoline and diesel fuel to a wholesale fuel tax would put the wholesale tax rate at about 6.98% (revenue neutral for FY2010).[33] If an additional $1.4 billion for the MTF were to come from motor fuel taxes this rate would increase to about 16.98%.

Scenario 3: Half Motor Fuel Tax Revenue Increase, Half Registration Tax Increase. This example scenario assumes that half of the additional funds come from increased motor fuel taxes and half from increased registration taxes. This would put the wholesale fuel tax at about 11.98% and the average registration tax would increase approximately 79%.

Scenario 4: 10 cent per Gallon Fuel Tax, Wholesale Fuel Tax, and Registration Tax Increase. This example scenario assumes that Michigan will keep a 10 cent flat rate fuel tax on both gasoline and diesel. The remaining additional MTF funds would be split evenly between a wholesale fuel tax levy and increased registration taxes. This scenario would contain a 10 cent per gallon fuel tax, a wholesale fuel tax rate of about 6.5%, and registration tax increase of about 50%.

Each of these example scenarios would collect an additional $1.4 billion for the MTF. These scenarios are made up of different funding sources which have different implications. We use these scenarios to discuss the potential employment impact of increasing the MTF by $1.4 billion.

ECONOMIC IMPACT OF FOUR FUNDING SCENARIOS

This section describes the potential employment impact of each of the four example scenarios in comparison to the current level of road infrastructure funding in the MTF. Each scenario's estimated employment impact is slightly different because each scenario brings in additional revenues from different sources.

As shown in Table 5 on page 24, on its own an additional $1.4 billion for road construction would create almost 25,000 direct and indirect jobs. However, a net impact analysis must consider what other expenditures by taxpaying house-

32. The revenue neutral wholesale tax is estimated based on the December 2011 wholesale prices of gasoline and diesel in the Midwest as calculated by the Energy Information Administration.

33. The revenue neutral rate is based on 2010 gasoline tax collections using the December 2011 average Midwest wholesale price of gasoline and diesel as calculated by the Energy Information Administration.

holds and businesses would have happened if the money were not dedicated to road construction.

TABLE 5. **Summary of Employment Impact Analysis Results**

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Impact of Tax and Government Expenditure Changes	(13,673)	(13,745)	(13,709)	(13,723)
Impact of Expenditures on Road Construction	24,952	24,952	24,952	24,952
Total Impact on Michigan Employment	11,279	11,207	11,243	11,230

Analysis: Anderson Economic Group LLC

At first it may seem counterintuitive that these scenarios result in a positive employment impact since they all involve spending funds that are taxed from households and businesses or diverted from other government expenditures. There are two main drivers of this result.

1. **Some funds otherwise spent out of state.** Some of the funds raised by increases in taxes and taxes in all scenarios would have been spent outside the state by households and businesses if not for the policy changes in the scenario, whereas they are all spent in the state if they are used on road construction. Second
2. **Some expenditures have different "multiplier" effects.** All of these scenarios involve changing the amount of funds expended by households, businesses, and state and local government road construction. The factors that affect how high a sector's employment multiplier is includes how labor-intensive the task is and how much the industry's supply chain is clustered in the state. Road construction has the highest multiplier in our analysis, and household expenditures the lowest. See "Appendix A. Methodology" on page A-1 for further discussion.

Table 6 on page 25 shows the different assumptions for how funds would otherwise have been spent (in the case of taxes), and the multipliers associated with each type of expenditure. See Table A-3 on page A-7 and Tables A-5 through A-8 in Appendix A for additional information about sources and analysis.

TABLE 6. **Key Assumptions Driving Economic Impact Analysis**

		Registration Taxes	Fuel Taxes	*Memo: Multiplier (Jobs per $1 million expenditures)*
Taxes	Otherwise Spent by Households in Michigan	81.4%	67.60%	*11.0501*
	Otherwise Spent by Businesses in Michigan	6.4%	17.30%	*14.5*
	Otherwise Spent outside of Michigan	12.2%	15.10%	*0*
Expenditures	Spending by Government (General Fund)			*17.8*
	Spending by Government (School Aid Fund)			*15.8206*
	Spending on Road Construction and Maintenance			*18.1191*

Source: Bureau of Labor Statistics; Bureau of Economic Analysis
Analysis: Anderson Economic Group LLC

The discussion below outlines the policy changes in each scenario and the employment impact results in greater detail. Also see "Appendix A. Methodology" on page A-1 following the body of this report for a detailed discussion of the assumptions underlying this analysis.

Scenario 1: Increase Registration Taxes

Almost 50% of MTF revenues come from motor vehicle title and registration taxes. According to data from FY 2010 the average annual registration tax paid in Michigan was approximately $112 per vehicle.[34] See "Registration taxes" on page 35. If all $1.4 billion additional funds were to come from registration taxes that would increase the tax to about $288 per vehicle. This is a 158% increase from the 2010 average tax paid.

TABLE 7. **Employment Impact of Scenario 1: Increased Registration Taxes on Road Infrastructure Investment (Compared to Baseline)**

Change In Employment (Direct and Indirect)		
Effect of Higher Registration Fees	Jobs Due to Change in Spending by Michigan Households	(12,388)
	Jobs Due to Change in Spending by Michigan Business	(1,286)
	Jobs Due to Change in Spending Outside Michigan	-
Effect of Increased MTF Investment	Jobs Due to Change in State Trunkline Fund Freeway Expenditures	6,737
	Jobs Due to Change in State Trunkline Fund Highways Expenditures	5,490
	Jobs Due to Change in Non-Trunkline Federal-Aid Road Expenditures	8,234
	Jobs Due to Change in Non-Federal-Aid Paved Road Expenditures	4,491
	Total Impact on Michigan Employment	**11,279**

Analysis: Anderson Economic Group, LLC

34. Not all vehicles pay the average registration tax. Registration taxes range from $30-$300 depending on the value of the vehicle when new. See Figure 6, "Vehicle Registration Taxes with Increase," on page 36.

Table 7 above shows the result of our analysis of Example Scenario 1, increasing motor vehicle title and registration taxes to collect $1.4 billion additional MTF dollars. We find that increasing the registration taxes from an average of $112 per vehicle to $288 per vehicle loses Michigan almost 14,000 jobs due to potential household and business spending. On the other hand the additional registration taxes going to the MTF result in almost 25,000 direct and indirect jobs. The end result of Example Scenario 1 is that increasing registration taxes to raise $1.4 billion additional MTF funds would help to create 11,279 new direct and indirect jobs in Michigan.

Scenario 2: Increase Motor Fuel Tax Revenue

Motor fuel tax collections are the second largest contributor to the MTF, second to registration taxes. If Michigan shifted the 19 cents per gallon and 15 cents per gallon gasoline and diesel fuel taxes (respective) to a wholesale percentage tax, the rate would be equal to 6.98%.[35] Example Scenario 2 raises all additional $1.4 billion for the MTF from motor fuel taxes alone. In order to raise this much from motor fuel taxes, the rate would be 16.98% on the wholesale price of fuel. If this tax were levied today it would increase the price of fuel (both gasoline and diesel) by roughly 45 cents per gallon.[36]

TABLE 8. Employment Impact of Scenario 2: Increased Motor Fuel Taxes on Road Infrastructure Investment (Compared to Baseline)

Change In Employment (Direct and Indirect)		
Effect of Higher Motor Fuel Taxes	Jobs Due to Change in Spending by Michigan Households	(10,287)
	Jobs Due to Change in Spending by Michigan Business	(3,457)
	Jobs Due to Change in Spending Outside Michigan	-
Effect of Increased MTF Investment	Jobs Due to Change in State Trunkline Fund Freeway Expenditures	6,737
	Jobs Due to Change in State Trunkline Fund Highways Expenditures	5,490
	Jobs Due to Change in Non-Trunkline Federal-Aid Road Expenditures	8,234
	Jobs Due to Change in Non-Federal-Aid Paved Road Expenditures	4,491
	Total Impact on Michigan Employment	**11,207**

Analysis: Anderson Economic Group, LLC

Table 8 above shows the employment impact of increasing motor fuel taxes to raise $1.4 billion additional MTF revenues. We find that increasing motor fuel taxes (which also increases the sales tax base) loses Michigan more than 15,000 potential jobs. However, the additional MTF funds would create almost 25,000 jobs. The net impact of increasing a motor fuel wholesale tax to raise $1.4 billion for the MTF is 11,207 direct and indirect jobs in Michigan.

35. The rate calculated at 6.98% is the revenue neutral rate for 2011 based on taxable gallons and the December 2011 average wholesale price of fuel.

36. This analysis assumes that the current price of gasoline in Michigan is $3.25 and the current price of diesel is $4.00 per gallon.

Scenario 3: Half Motor Fuel Tax Revenue Increase, Half Registration Tax Increase

The third example scenario we have created shows the effects of raising half of the $1.4 billion by increasing registration taxes and raising remaining half by increasing the wholesale motor fuel tax. Under the current system, motor fuel and registration tax revenues make up the majority of funds in the MTF. Splitting the increase equally among these two is similar to scaling up the current system because both revenue sources contribute roughly half of MTF revenues. If rate changes were enacted today we would see the average registration tax paid increase from $112 per vehicle to about $200 per vehicle. Under this scenario the motor fuel tax would increase from 6.98% on the wholesale price of motor fuels to 11.98%. The average price of a gallon of gas or diesel would increase approximately 30 cents per gallon.[37]

TABLE 9. Employment Impact of Scenario 3: Increase of Motor Fuel Tax and Registration Tax on Road Infrastructure Investment (Compared to Baseline)

Change In Employment (Direct and Indirect)		
Effect of Higher Registration Fees and Motor Fuel Taxes	Jobs Due to Change in Spending by Michigan Households	(11,338)
	Jobs Due to Change in Spending by Michigan Business	(2,372)
	Jobs Due to Change in Spending Outside Michigan	-
Effect of Increased MTF Investment	Jobs Due to Change in State Trunkline Fund Freeway Expenditures	6,737
	Jobs Due to Change in State Trunkline Fund Highways Expenditures	5,490
	Jobs Due to Change in Non-Trunkline Federal-Aid Road Expenditures	8,234
	Jobs Due to Change in Non-Federal-Aid Paved Road Expenditures	4,491
	Total Impact on Michigan Employment	**11,243**

Analysis: Anderson Economic Group, LLC

Table 9 above shows the net employment impact of raising $1.4 billion additional MTF dollars by increasing both the motor fuel tax and vehicle registration taxes. Increasing both of these is associated with about 14,000 lost potential jobs. On the other side, additional MTF revenues helps to create almost 25,000 jobs in Michigan. The net impact of raising half of the additional MTF revenues from increasing the motor fuel tax and half from increasing the registration tax is 11,243 jobs in Michigan.

Scenario 4: 10 cent per Gallon Fuel Tax, Wholesale Fuel Tax, and Registration Tax Increase

The final example scenario we have created assumes that Michigan has a 10 cent per gallon fuel tax (for both gasoline and diesel) as well as a wholesale fuel tax and increased registration fees. Collecting an additional $1.4 billion using

37. This analysis assumes that the average price of gasoline in Michigan is $3.25 per gallon, and the average price of diesel is $4.00 per gallon.

this scenario would mean that Michigan's wholesale fuel tax rate would be about 6.5% and the average per vehicle registration tax would be about $167. The wholesale tax rate is slightly lower than the revenue neutral tax rate we calculated previously in this analysis. The wholesale rate can be lower than the revenue neutral rate because this scenario contains a 10 cent per gallon flat-tax. This scenario shows registration taxes increasing about 50% from their current level and the average price at the pump for gasoline and diesel would increase approximately 25 cents.

TABLE 10. Employment Impact of Scenario 4: 10 cent per Gallon Fuel Tax, Wholesale Fuel Tax, and Registration Tax Increase (Compared to Baseline)

Change In Employment (Direct and Indirect)		
Effect of Higher Registration Fees and Motor Fuel Taxes	Jobs Due to Change in Spending by Michigan Households	(10,939)
	Jobs Due to Change in Spending by Michigan Business	(2,784)
	Jobs Due to Change in Spending Outside Michigan	-
Effect of Increased MTF Investment	Jobs Due to Change in State Trunkline Fund Freeway Expenditures	6,737
	Jobs Due to Change in State Trunkline Fund Highways Expenditures	5,490
	Jobs Due to Change in Non-Trunkline Federal-Aid Road Expenditures	8,234
	Jobs Due to Change in Non-Federal-Aid Paved Road Expenditures	4,491
	Total Impact on Michigan Employment	**11,230**

Analysis: Anderson Economic Group, LLC

Table 10 above shows the economic impact of scenario four. This analysis shows that reduced household and business spending would result in almost 14,000 fewer jobs in Michigan. The increased road spending on the other hand increases employment by almost 25,000. The net impact of scenario four is 11,230 jobs in Michigan.This analysis is almost equivalent to scenario three. This is because both scenarios split the burden between fuel taxes and registration taxes. While scenario three shows an even split between increased fuel taxes and increased registration taxes, scenario four is equivalent to 69% of additional MTF funds coming from fuel taxes and 31% from registration fees.

Additional Scenario Considered: Dedicated Sales Tax

In addition to the statutory funding sources we examined in the four funding scenarios, some policymakers have considered the possibility diverting a portion of the state's sales and use taxes, namely those currently paid on purchases of motor fuels, from their current uses to the MTF. This is discussed further in "Transportation Infrastructure Funding Options" on page 30.

While we have limited our employment impact analysis to scenarios achievable under the current constitution, we note that a preliminary examination of this proposal showed that the economic impact is likely lower and has much greater uncertainty than the other scenarios analyzed in this report. This is because the funds would be diverted from the General Fund and School Aid Fund on a scale that would make the reactions by state and local governments and school dis-

tricts difficult to predict. Such reactions could include reducing expenses through layoffs, reducing compensation, reducing transfers to program beneficiaries, outsourcing certain activities to private contractors, restructuring operations, or increasing taxes. This range of possible reactions is associated with a set of employment multipliers that varied widely, resulting in widely varying net economic impact results (including a negative net employment impact under some assumptions).

ECONOMIC IMPACT ANALYSIS IN PERSPECTIVE

As noted above, one of the main drivers of the positive employment impact result is the relative size of impact multipliers in different sectors. A naive interpretation of this result might lead policymakers to conclude that raising taxes to increase construction spending, or diverting state expenditures from less to more labor-intensive activities would always be "good for the economy." This is not necessarily the case.

The employment impact analysis presented in this report is an "input-output" analysis, which considers the effects of changes in expenditures by different sectors of the economy as a result of tax and expenditure policy changes. It does not attempt to consider long-run adjustments made by private actors when faced with a new environment that includes changes in incentives, changes in infrastructure quality, and other productivity-affecting government expenditures. It is these considerations that make up the true rationale behind the proposed infrastructure investment changes: the governor has proposed increasing road construction and maintenance spending not to create construction jobs, but rather to build long-lived assets that affect the quality of our road infrastructure and thereby improve our quality of life and business climate in the state.

III. Transportation Infrastructure Funding Options

This section discusses the potential funding sources analyzed earlier in this report in greater detail. Below we identify each source's basis in law and Michigan's constitution, as well as important features from an economic and tax policy perspective.

BASIS OF "GOOD" TAX POLICY

Drivers and businesses benefit from access to and the option of using public roads. Publicly-provided goods do not have a price, but it is helpful for economic efficiency to pay for these goods by taxing those who benefit. Although qualities that comprise a "good" tax policy can be subjective, as well as partisan, generally policies resembling "user fees" are considered best practice. Someone is paying a user fee when he or she chooses to use a government service and must pay for it.

Taxes differ from user fees in that taxes are not directly tied to what a taxpayer receives. A person essentially pays both a user fee and a tax when paying for something he or she is not getting or does not want. True user fees charge a person for access to a government service. Instinctively, most people sense a certain fairness about them. User fees also align with rational economic decision-making: Is this service worth the price or should I choose a more economical option?

Of the funding options, none are a perfect user fee, which would:[38]

- defray the costs of a regulatory activity (or government service), rather than simply raise general revenue
- be proportionate to the necessary costs of the service
- be voluntary (a person only must pay the fee to use the public good or service)

Throughout this section, we consider each funding option in terms of how closely it acts as a user fee and adheres to each criterion. In Michigan particularly, the question of whether a charge is a tax or a user fee can be significant because of the limitations placed on taxation in the State Constitution.

CONSTITUTIONAL LIMITATIONS

The example funding options discussed in this report are subject to constitutional limitations on how the funds are used and on how much revenue can be collected by state government. This section discusses these limitations.

38. This criteria differentiates a user fee from a tax and is from the Michigan Supreme Court Case, *Bolt v. City of Lansing*, 1998.

Dedication of Fuel Taxes

Michigan's Constitution specifically dedicates all taxes, both indirect and direct on fuel to go towards transportation purposes, except for sales tax.[39] This applies to the state's current excise taxes on fuel, but not the sales tax that is generated from the sale of fuel.[40] It appears that the wholesale tax would be dedicated to transportation funding, just as Michigan's current fuel tax is, under Article IX. This is an issue that should be explicitly addressed in legislation enacting the tax.

Headlee Amendment

In 1978, Michigan voters passed the Headlee Amendment, which put constitutional limitations and restrictions on government expenditures and revenues at the state and local level. It stipulates that new taxes levied by local governments must be approved by voters. This would not apply to the funding options described in this section, although it would for some of the Governor's proposals for efficiency, specifically locally levied registration taxes.[41]

The Headlee Amendment does not preclude imposing new *state* taxes, but it does stipulate that projected revenues cannot exceed the level specified in Article IX, Section 26 of Michigan's 1963 Constitution. Generating an additional $1.4 billion for roads would not currently put Michigan in danger of exceeding the state's revenue limit.[42]

MOTOR FUEL EXCISE TAXES

In addition to the federal excise tax of 18.4 cents per gallon of gasoline and $24.4 cents per gallon of diesel, each state levies its own tax on fuel. Currently, the state of Michigan has a 19 cent tax on gas and 15 cent tax on diesel. The basic justification for both an excise tax is what economists call the benefit principle of taxation.[43] This principle states that consumers of government services should pay in proportion to the benefit they obtain from those services.

39. As stated in Article IX, Section 9 of Michigan's Constitution (1963), "all specific taxes, except general sales and use taxes and regulatory fees, imposed directly or indirectly on fuels sold or used to propel motor vehicles upon highways... after the payment of necessary collection expenses, be used exclusively for transportation purposes".

40. These revenues are first credited to the Michigan Transportation Fund, and then distributed to other funds and programs according to Act 51 of 1951.

41. See "Efficiency Related Proposals" on page 19.

42. The Headlee amendment limits government revenue to 9.49% of personal income. Using 2009 income levels, consensus estimates that Michigan will be $6.9 billion below this level for FY2011 and within similar distance for 2012. Source: Personnel at the Senate Fiscal Agency.

43. The benefit principle is a cornerstone of the theory of tax justice, as well as widely accepted as sound tax policy in modern public finance theory.

If we assume that all drivers derive the same benefit per mile from driving on public roads, fuel is a good proxy to charge for this. The more a person drives, the more gas it requires. The gas tax is not, however, a pure user fee because drivers with more fuel efficient vehicles and those with electric cars pay significantly less than other drivers.

Additionally, drivers with vehicles that use gas instead of diesel pay a higher fee than those that use diesel. This is a perceived inequality of the existing excise taxes because drivers do not directly and exclusively pay according to how often they use the roads. Below in Table 11, we show the estimated amount of revenue that would be generated if both gas and diesel were taxed at the same rate, rather than at 19 and 15 cents per gallon.

TABLE 11. Estimated Revenue From Gas and Fuel Taxes (in millions)

	Revenue Generated from Gas Tax	Revenue Generated by Fuel Tax	Total Revenue Generated by Gas and Fuel Taxes
1 cent per gallon	$ 45.0	$ 6.9	$ 51.9
5 cent per gallon	$ 224.9	$ 34.3	$ 259.2
10 cent per gallon	$ 449.7	$ 68.7	$ 518.4
15 cent per gallon	$ 674.6	$ 103.0	$ 777.6
20 cent per gallon	$ 899.5	$ 137.4	$ 1,036.9

Note: Revenue estimated by multiplying tax per gallon by the number of taxable gallons of regular and diesel fuel, then rounded to the nearest hundred thousand.

Source: Michigan Department of Treasury
Analysis: Anderson Economic Group, LLC

Together the gas and fuel tax contribute just over half of the revenue for the Michigan Transportation Fund (MTF). Although the current revenue from gas taxes has been decreasing. Residents are consuming fewer gallons of gasoline from driving less, as well as investing in more fuel efficient cars. From the "user" standpoint, which we discussed in "Basis of "Good" Tax Policy" on page 30, the growing technology of cars makes the gas tax a less suitable funding option. Without changing this tax to adjust with inflation, it will deteriorate over time, just as it has over the past two decades. It has recently been proposed that a wholesale percentage tax replace the existing excise taxes, which we discuss below.

WHOLESALE FUEL TAX

A wholesale gas tax has been proposed to replace these taxes. Specifically, the percentage tax would be applied to the cost of the fuel to the wholesalers plus the federal fuel taxes.[44] Politically, this tax could be marketed as repealing the gas tax and targeting oil companies. Although we assume that wholesalers would pass

along the cost of this tax to consumers by increasing the price of gasoline proportionally. Similar to the existing excise tax discussed previously in this section, a wholesale gas tax would act as a proxy for damage done to public roads. This proxy is a bit less direct, as the fee is proportional to the price of gasoline, rather than the number of gallons.

In terms of rates, this tax achieves parity between gasoline taxes and diesel fuel taxes. Taxing both gas and diesel at the same rate places a higher user fee on diesel vehicles because diesel fuel is generally more expensive, although used far less frequently.[45] Diesel vehicles, such as trucks, also tend to be less fuel efficient, making them already pay more per mile driven. A higher fee for one user over another can be reasonable if the former derived greater benefit or required a service at a higher cost. As most diesel vehicles are heavier, logically one would assume that they do more damage to the roads.[46]

Although the wholesale tax has been proposed as revenue neutral, it could be a potential funding option for Michigan's roads, if implemented above the proposed introductory rate.[47] In Table 12 on page 34, we show our estimations for the additional revenue a wholesale tax could potentially generate for Michigan. To generate the nearly $1.4 billion for road repair, the tax rate would need to be approximately 17%. This would push the price per gallon to be $3.67 (regular) and $4.46 (diesel).

For our estimations, we assume that fuel consumption will not be altered by the price increase caused by the wholesale tax on gas and diesel. To a certain extent, gas consumption is inelastic– people require gas to go about their everyday activities, such as getting to and from work.[48] This does not mean that the state will experience a windfall in tax revenue due to a large increase in taxes (and gas prices). Particularly, the state's sales tax should be largely unchanged for two reasons. First, a wholesale tax on motor fuels is that it would not interact

44. Taxes would continue to be collected at the same few points as they currently are; thus this tax would be similarly efficient to the current gas and fuel taxes.

45. Over six times as many taxable gallons of gas (4.4 billion) are purchased than diesel (686 million) in FY 2010. Source: Michigan Department of Treasury.

46. Michigan enacted seasonal weight restrictions to "help minimize the impact of heavy trucks on Michigan's roads" during the Spring cycle of freezing and thawing. By law, road agencies can enact weight restrictions on roads that are not designated as all-season routes when conditions merit. Source: County Road Association of Michigan.

47. The introductory rate used in Governor Snyder's proposal is 6.7%. AEG estimated the rate to be similar at 6.98%.

48. Elasticity is a measure of market responsiveness to a good. When the demand for a good is inelastic, price does not largely affect the demand for that good. In practice, gas is not completely inelastic in demand– the state has seen a decline in the number of gallons consumed as prices have increased. However, predicting the amount of gallons of gasoline that consumers will no longer purchase due to rising prices is outside the scope of this report.

with the state sales tax. Currently the state sales tax applies to the "market" price and federal excise taxes on fuels (an example of double-taxation), but not to state excise taxes. Michigan's excise taxes on fuel are already collected at the wholesale level, which would make it easy for Treasury to separate out the wholesale tax on fuel from the sales tax base. Thus Michigan residents would not face double taxation by using this funding option. Secondly, households face budget constraints and if they choose to drive the same amount of miles, they will consume less of other taxable products, which would offset the change in sales revenue. We note that as gas prices rise the MTF's revenue would increase slightly.[49] A household may alternatively choose to drive less by taking fewer vacations, carpooling to work or school and using alternative forms of transportation. Table 12 does not reflect the potential impact price may have on the number of gallons of fuel purchased.

TABLE 12. Estimated Additional Revenue From Wholesale Gas Tax

	Gasoline		Diesel		Additional Revenue Generated from Wholesale Tax
Tax Rate	Additional Revenue (in millions)[a]	Price Per Gallon for Consumers[b]	Additional Revenue (in millions)[c]	Price Per Gallon for Consumers[d]	
8%	$91.4	$3.43	$43.0	$4.19	$134.4
10%	$325.2	$3.49	$84.7	$4.25	$410.0
12%	$559.1	$3.54	$126.5	$4.31	$685.6
14%	$792.9	$3.59	$168.3	$4.37	$961.3
16%	$1,026.8	$3.64	$210.0	$4.43	$1,236.9
17%	$1,143.7	$3.67	$230.9	$4.46	$1,371.9[e]

Note: AEG kept the number of gallons of gasoline constant for this analysis. In practice, as price increases consumers may purchase less gasoline due to budget constraints.
Source: Michigan Department of Treasury
Analysis: Anderson Economic Group, LLC

a. We assume that the wholesale price of gasoline is $2.60, which was the Midwest average in December 2011. We rounded additional revenue to the nearest hundred thousand.

b. To estimate the price per gallon, we added the wholesale price, federal gas excise tax (18.4 cents), an estimation of retail markup (26 cents) and multiplied it by 6% (Michigan's sales tax). To avoid double taxation, we added this amount to the wholesale tax per gallon.

c. We assume that the wholesale price of diesel is $3.04, which was the Midwest average in December 2011. We rounded additional revenue to the nearest hundred thousand.

d. To estimate the price per gallon, we followed the same methodology described in footnote b, except we used the federal diesel excise tax (24.4 cents), and 44 cents as an estimation of retail markup.

e. It is estimated that we need just short of $1.4 billion ($1,377,130,000).

49. A small portion of the sales tax on gasoline is dedicated to transportation, which we discuss in "Dedicating Existing Sales Tax Revenues" on page 37.

Switching Michigan's gasoline tax to one based on price could better protect the purchasing power of the tax, but it will also depend on how gasoline prices change in the future. As discussed in "Insufficient funds" on page 14, inflation has eroded away the current excise tax and in this case, falling gasoline prices could do the same. Gas prices have been steadily increasing over the past decade, although it is not uncommon for one decade to have higher gas prices than another. This funding option is therefore volatile and vulnerable to the price of gas. Adding ceilings or floors to this tax would increase its stability as a funding source and limit windfalls or large declines but would introduce new inflation-indexing problems. These include:

- How to index revenue ceilings and floors to inflation when the current motor fuels were not.
- Ceilings and floors would face political scrutiny when implemented (e.g. if oil prices dropped and a revenue floor automatically raised the wholesale tax rate).

REGISTRATION TAXES

The registration fees, or taxes paid by each driver in Michigan annually, go towards maintaining the state's roads. The applicable vehicle registration tax rate is complex and a function of a number of factors: the vehicle model year, the list price of the vehicle, the weight of the vehicle, the use of the vehicle and in some cases, some characteristic of the vehicle owner.[50]

Overall, vehicle taxes correspond to the value of a driver's vehicle, which roughly correlates to a driver's income. This appeals to a "fairness" principle because those with a greater ability to pay will pay increased fees. However, discriminating by income is not a characteristic of a user fee. A Lexus does not do more damage to roads nor does its driver benefit more from driving on public roads than a Oldsmobile. Additionally, registration taxes only apply to Michigan residents, allowing out-of-state drivers, while potentially few, to escape user fees.

Current registration taxes range from $30 to $300 dollars, depending on the vehicle. It has been suggested that increasing the current registration fees could be a potential funding option. This is the only funding option that attempts to address the issue of more fuel efficient vehicles. Instead of tying the growth of tax revenue to the consumption of gasoline, it increases with vehicle prices. In addition to raising registration taxes, it has been proposed that the Secretary of State office get rid of the existing registration discounts, which we describe below.

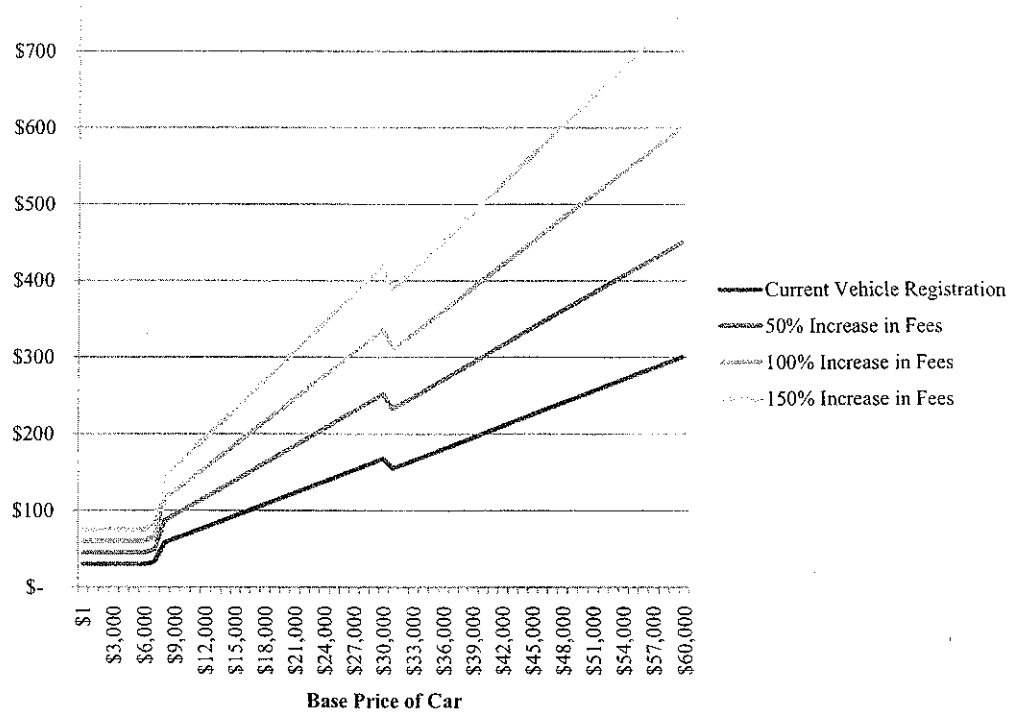
Eliminating vehicle registration tax discounts. For three consecutive years after a new car is purchased, the value of a vehicle is discounted 10 percent in

50. There are a number of different registration taxes established in Sections 801 through 810 of the Michigan Vehicle Code.

order to calculate the new vehicle registration tax. It has been proposed along with an increase in registration taxes that these discounts be eliminated immediately for all vehicles (not just new ones).[51] While most people would not notice this change as these discounts are not widely known by Michigan drivers, these fees would be similar to a delayed sales tax, where drivers would be taxed based on a value that their vehicle no longer holds. Currently, vehicle registration taxes are similar to property taxes. However, as a road user fee, it does not make sense for the fee to decline over time with the value of the vehicle.

This funding option does not seem particularly feasible by itself for several reasons. Fees would need to more than double on average for Michigan drivers because only about $87 million dollars is generated for every 10% increase in registration taxes.[52] Below in Figure 6, we show what Michigan drivers would pay if registration taxes were increased and fees no longer took into account depreciation the first three years.

FIGURE 6. Vehicle Registration Taxes with Increase



Source: "Outline of the Michigan Tax System," Citizens Research Council of Michigan, 2010
Analysis: Anderson Economic Group, LLC

51. An alternative is to phase in the loss of the discounts by applying to new vehicles only, which would reduce the additional revenue, but rise incrementally over time.

52. Michigan Infrastructure Transportation Association.

If fees were doubled (increased by 100%), some drivers could pay up to $600 annually to drive on Michigan's roads. Such a significant change would be very apparent to drivers and potentially burdensome. Being collected once a year, additional registration taxes may be difficult for households and families with multiple vehicles.[53] Increasing registration taxes is more likely politically feasible if it were paired with one of the other options of funding discussed in this section.

DEDICATING EXISTING SALES TAX REVENUES

As noted in "Economic Impact of Four Transportation Infrastructure Funding Scenarios" on page 22, some policymakers have considered the possibility of diverting a portion of the state's sales and use taxes (those currently paid on purchases of motor fuels) to the MTF. Currently, the sales of motor fuels are subject to the state's 6% sales tax.[54] The tax base for the sales tax on gasoline sales includes the motor fuel retail price and federal excise tax, although not the state's motor fuel excise tax.

Michigan's sales tax revenue is constitutionally and statutorily earmarked to several funds. The School Aid Fund (SAF) receives the revenue generated from 2 percent of the 6 percent sales tax, as well as 60% of the tax generated by the sales tax at the 4 percent rate. Of the remaining revenue generated by the sales tax at the 4 percent rate:

- 15 percent is constitutionally earmarked to revenue sharing for local governments on a per capita basis
- 21.3 percent earmarked to local governments based on a statutory allocation, which is subject to legislative appropriation
- The remaining 3.7 percent of sales tax revenue raised by the 4 percent rate is deposited into the General Fund
- Note that 27.9% of one percent generated from automotive-related sales is deposited into the Comprehensive Transportation Fund (CTF).[55]

Dedicating the sales tax revenue from gasoline sales to go to road repair would create a considerable gap in the School Aid Fund, approximately $325 million in the first year. For comparison purposes, this is approximately 2.5% of the FY 2010-11 executive recommendation for School Aid Fund (though the proposed change would occur in a different year). This gap would be both politically

53. We note that while registration taxes are tax deductible on federal income tax forms, residents do not largely recoup the additional cost.

54. Established under General Sales Tax Act (1933 PA 167).

55. Additionally, an amount equal to the sales tax on sales of computer software must be deposited into a fund for the Michigan Public Health Initiative. The amount earmarked to the Public Health Initiative is required by law to be at least $9 million and no more than $12 million each year.

unpopular and require policy makers to think through how to make up for this loss.

Dedicating the sales tax revenue generated by gasoline would indirectly link a driver's road usage to the amount of tax they pay. It is not a direct link because not all cars require the same amount of gas to travel the same number of miles. Those with more fuel efficient vehicles will pay less per mile travelled. A more feasible funding option would be to redirect a portion of the sales tax, which would not need a constitutional amendment. We describe this option below.

Redirecting sales tax revenue. Introduced in April of 2011, House Bill 4521 (H-1) proposes to redirect a portion of sales tax revenue related to gasoline sales to state and local road programs.[56] The bill would effectively direct an amount equal to 18% of the tax collected from 4% of the sales tax on motor fuels. This would essentially shift this revenue from the General Fund to state and local road programs. This revenue is estimated to range from $83.1 million (at $3.00 per gallon) to $112.7 million (at $4.00 per gallon).[57] The state legislature would then need to act to reduce expenditures from those currently planned or raise revenue from other sources.

Both dedicating and redirecting the revenue generated by sales tax on fuel essentially excludes it from the normal sales tax base. Although both could raise funds for transportation, they both go against a rule of economic efficiency; a broad tax base.

If all of the sales taxes collected on the sale of motor fuels were to be allocated to the MTF, it would raise about $1.07 billion. This amount falls short of the $1.4 billion target by about $300 million.

56. The Committee on Transportation moved to adopt H-1 in May, but at the time of this report, the House and Senate have not yet voted on this bill. There is also a similar Senate Bill to HB 4521: SB 351.

57. House Fiscal Agency, Legislative Analysis of House Bill 4521 (Substitute H-3).

IV. Additional Benefits of Investing in Transportation Infrastructure

The condition of Michigan's road infrastructure affects personal safety, costs of congestion such as wasted time and excess fuel use, and household expenditures on vehicle repairs. This section briefly summarizes evidence noted in our 2010 report on transportation infrastructure.[58]

IMPACT OF ROAD CONDITIONS ON SAFETY

Road conditions can contribute to collisions and in some cases the severity of a crash. A study by the Pacific Institute for Research and Evaluation estimates that road conditions contributed to one-third of all crashes nationally in 2006.[59] The study defines road conditions as contributing to the crash if one of several road factors were present at the time of the crash including: a traffic control device not functioning, congestion, insufficient elevation and drainage of the road, signs missing, and bad lane marking. The study defines road conditions as increasing the severity of the crash if the driver was moderately to fatally injured in a vehicle that hit a large tree or medium or large non-breakaway pole, or if the first harmful event was collision with a bridge.[60]

In 2007, over 324,000 crashes occurred in Michigan resulting in nearly 82,000 injuries and 1,084 fatalities.[61] We applied the Pacific Institute's estimate of the proportion of crashes where road conditions contributed nationally to Michigan crashes and estimate 101,791 crashes in Michigan occurred or increased in severity due to road conditions.[62]

REDUCTIONS IN WEALTH DUE TO POOR ROAD CONDITIONS

Poor road conditions can lead to accidents and traffic jams, which waste money and fuel, as well as result in unnecessary repairs and medical bills. Below we discuss the cost of medical bills and vehicle repairs in Michigan due to poor road conditions, as well as the cost of congestion.

58. "Michigan's Roads: The Cost of Doing Nothing and the Rewards of Bold Action," AEG 2010

59. Crashes were identified as road-related if an occupant was moderately to fatally injured and roads were considered contributors either in occurrence or crash severity. See Dr. Ted R. Miller and Dr. Eduard Zaloshnja, *On a Crash Course: The Dangers and Health Costs of Deficient Roadways*, A Study by the Pacific Institute for Research and Evaluation, May 2009.

60. Ibid.

61. See *Michigan's Road in Crisis*, A Report of the Highway, Road and Bridge Subcommittee of the Citizens Advisory Committee, July 21, 2008.

62. See "Appendix A. Methodology" for data and calculations.

The Cost of Crashes Involving Road Conditions

Vehicle crashes are costly, especially when they are not caused by other drivers, but rather road conditions. Crashes can produce injuries that require medical care, diminish quality of life, vehicle damage that require repairs, time delays, and productivity and quality of life losses.

The Pacific Institute study, *On a Crash Course*, used a national data set of detailed causes of large truck crashes to model the probability that road conditions contributed to car crashes.[63] Using several data sets that included medical details of injuries from crashes, the cost of vehicle damage, and travel delay, the Pacific Institute study modeled crash costs. Using previous research, they modeled how injuries reduce productivity in the workplace and the household, and resulted in pain and suffering for those individuals. By placing a value on these loses in productivity and quality of life, the Pacific Institute researchers estimated the cost of these events.

For our purposes, we focus on the two most tangible reductions in wealth of Michigan households due to road condition related crashes—medical costs and vehicle repairs.[64] Using the Pacific Institute study's findings, we estimate that $542 million of vehicle repairs were due to crashes involving poor road infrastructure in Michigan in 2006. We estimate that the average cost of property damage per crash is $5,320, using our 2007 estimate of the number of crashes due to road conditions. Medical costs due to a vehicle crash can often be significant. The Pacific Institute estimates that crashes involving poor road infrastructure resulted in $383 million in medical costs in 2006. We estimate this cost to average $3,763 in medical costs per crash in Michigan.[65]

The Cost of Road Condition Related Congestion

Poorly funded and maintained road infrastructure creates congestion in three ways:

- Poor road infrastructure can create accidents that would otherwise not occur.
- Roads that are not adequately maintained require more time and money when they are fixed.[66]
- Poor road infrastructure can result in too few lanes to support traffic during peak travel times waste drivers' time and money as they sit idly in traffic jams.

63. Their study assumes that in the U.S. truck crashes have similar causes to other crashes.

64. We recognize that placing a value on human suffering and loss of productivity is somewhat controversial and we do not report those costs in this report, but recognize that vehicle crashes do produce quality of life and productivity losses for Michigan residents.

65. See Dr. Ted R. Miller and Dr. Eduard Zaloshnja, *On a Crash Course: The Dangers and Health Costs of Deficient Roadways*, A Study by the Pacific Institute for Research and Evaluation, April 2009.

The Texas Transportation Institute (TTI) conducts an annual study of the cost of congestion in urban areas, which includes data for two of Michigan's metropolitan areas: Detroit and Grand Rapids. As nearly half (46%) of the state's population lives in theses two metropolitan areas, they should provide a good indication of the cost of traffic congestion in the state. As shown below in Table 13, TTI estimates that congestion costs state residents driving in the Detroit area over $2.4 billion and residents driving in the Grand Rapids area $148 million in 2007.

TABLE 13. Cost of Congestion in Detroit and Grand Rapids, 2007

	Detroit	Grand Rapids
Inputs		
Population	4,050,000	600,000
Peak Number of Travelers	2,268,000	330,000
Excess Fuel Consumed (Gallons)	76,425,000	4,335,000
Fuel Cost per Gallon	$3.06	$3.06
Total Delay (Number of Person Hours)	116,981,000	7,324,000
Commercial Cost of Delay per Hour (Time and Fuel Costs)	$102.12	$102.12
Passenger Cost of Delay per Hour	$15.47	$15.47
Congestion Cost Measure		
Total Cost from Delay and Excess Fuel Consumed (millions)	**$2,472**	**$148**

Source: Texas Transportation Institute Urban Mobility Report 2009; Note 2007 data
Analysis: Anderson Economic Group, LLC 2010

By applying the same parameters as the TTI study to the entire state, we estimate the cost of congestion in the remaining areas of the state is 10% of the combined cost for Detroit and Grand Rapids. This adds an additional cost of $262.3 million to residents in the form of fuel costs and value of time wasted in 2007. In Table 14, we show the total cost of congestion to be nearly $2.9 billion or $287 per person.

66. Cost effectiveness data from the Michigan Department of Transportation show that preventative maintenance that maintains and extends the life of the road are less expensive than reconstruction. See *Pavement Preservation: Applied Asset Management*, National Center for Pavement Preservation, MSU, November 2006.

TABLE 14. AEG Estimate of Total Cost of Congestion in Michigan, 2007

	Cost (millions)
TTI Estimate of Cost of Congestion for Detroit and Grand Rapids	$2,620
AEG Estimate of Cost of Congestion for Remaining Urban Areas	$250
AEG Estimate of Cost of Congestion for Remaining Rural Areas	$12
Total Cost of Congestion for the State of Michigan	$2,882
Memo:	
Cost of Congestion per Person	*$287*

Source: Texas Transportation Institute Urban Mobility Report 2009
Analysis: Anderson Economic Group, LLC 2010

See "Road Infrastructure's Impact on Michigan Households on page A-13 for our complete methodology for cost estimates reported in this section.

Appendix A. Methodology

ECONOMIC IMPACT OF ROAD CONSTRUCTION

In "Economic Impact of Four Transportation Infrastructure Funding Scenarios" on page 22, we estimate the economic impact of four example funding scenarios compared to a baseline. The baseline assumes the current level of funding for the MTF. All four example scenarios provide for approximately $1.4 billion additional dollars for the Michigan Transportation Fund (MTF), each with a different source or combination of sources for additional revenues. This section defines "net impact" and describes the methodology used to complete this analysis.

Net Impact Defined

Net economic impact is the additional economic activity caused by transportation construction and maintenance activity. A *net* measure of economic impact must take into account potential alternative uses for the money spent on infrastructure investment so that only new economic activity is counted.

This *net* employment impact analysis quantifies the direct and indirect employment impact of road construction and maintenance minus of any foregone employment in other parts of the economy due to taxes and fees used to fund the MTF. Any accurate economic impact analysis must properly account for both the costs and benefits, including the costs and benefits from taxpayers substituting tax payments for other expenditures.

This report accounts for substitution. Since the MTF is funded primarily through vehicle registrations and per-gallon taxes on diesel fuel and gasoline variations in funding could occur through a combination of several factors. Each of the four example scenarios in this report provides additional funds to the MTF through motor fuel taxes, registration fees, and a combination of these. These factors include changes in behavior, such as more miles driven or more vehicles registered by Michigan's citizens and visitors, and policy changes, such as an increase in vehicle registration fees or taxes on fuel. Accounting for substitution requires that this analysis acknowledge that money not spent on taxes and fees funding the MTF would otherwise have been spent elsewhere, potentially supporting employment in Michigan. However, MTF revenue coming from out of state residents and businesses, and federal funding, are not subject to the same type of substitution analysis since their spending would otherwise occur outside of Michigan.

Economic Impact Analysis

To estimate the employment impact of Michigan Transportation Fund funding scenarios we used the following methodology:

1. We identified the FY 2012 MTF funding levels associated with the "Baseline" and four "Example Scenarios". The "Baseline" funding level is the MTF fund-

ing level associated with extending current law, as forecast by the House Fiscal Agency's rolling update of MTF funds. Example Scenario 1 assumes that additional investment will come solely from increasing vehicle registration taxes; Example Scenario 2 assumes that all revenues will come from increasing motor fuel taxes; Example Scenario 3 assumes that half of the additional funds come from a motor fuel tax increase and half from a vehicle registration tax increase; and Example Scenario 4 assumes a 10 cent per gallon flat-rate fuel tax, a wholesale tax levy, and a registration tax increase. See Table A-2, "Example Scenarios for Achieving Proposed New Funding Level," on page 6.

2. We use the breakdown of funds from the Michigan Work Group on Transportation Funding report to allocate funds to State Trunkline Freeways, Trunkline Highways, Federal-Aid roads, and non-Federal-Aid paved roads. The MTF traditionally allocates funding to the Trunkline, Counties, and Cities and Villages. However, this analysis assumes that asset management principles will be used on all roads. This means that funding will go to where it is needed most for required maintenance rather than be allocated solely based on the entity in charge of the road. See Table A-1, "Increase in Funds for the Michigan Transportation Fund, Baseline and Proposed New Funding Level for FY 2011-2012," on page 5.
3. We identified the proportion of registration taxes and fuel taxes paid by Michigan households, Michigan businesses, and those outside of Michigan. Using the Consumer Expenditure Survey we estimated out-of-state spending for the average household. We used this along with the percentages of sales taxes and registration fees paid by households and businesses to estimate how much of each dollar for every revenue source is contributed by households, business, or out-of-state visitors. These proportions were used in the counterfactual analysis to show the funds that would have been spent by each of these entities if we did not increase taxes for the MTF. See Table A-3, "Assumed Use of MTF Revenue Source Funds by Households and Businesses if Taxes Are Not Levied," on page 7.
4. We estimated the proportion of funds that would have been spent in Michigan by Michigan households and business, and outside of Michigan for each example scenario. See Table A-4, "Alternative Uses of MTF Funding by Households and Businesses," on page 8.
5. We estimated the direct and indirect employment associated with construction spending, spending by households, and spending by businesses using multipliers supplied by the Bureau of Economic Analysis's RIMS II Input-Output multiplier series. The "Final Demand Employment" multipliers from this series provide an estimate of the total number of jobs created by each additional $1 million spent in specific industries in Michigan. We evaluated spending by Michigan households using the "Households" industry multiplier. We evaluated spending by businesses based on a weighted average multiplier. Of the 62 types of entities represented by the RIMS II series, 14 of them we considered to be heavy users of transportation infrastructure. These industries are, utilities, wholesale and retail trade, truck transportation, transit, warehousing and storage, professional, scientific, and technical services, administration and support services, waster management, ambulatory health care, nursing and residential care, performing arts, spectator sports, museums, zoos, and parks, amusements,

gambling, and recreation, and "other services" which includes motor vehicle maintenance. We took the multipliers for each of these, weighted them by their state GDP contribution to Michigan, and then weighted them again by their "fuel intensity". We assume fuel intensity as a measure between zero and one that could estimate how heavily the industry relies on motor vehicles and motor fuel for their operations. We evaluated spending on road construction and maintenance using the "Construction" industry multiplier. While this multiplier is not specific to road construction, our judgement is that this multiplier is representative of the road construction industry, which operates on a similar scale and is similarly labor-intensive compared with other types of construction. See Tables A-5 through A-8 in Appendix A.

6. We then estimated the total net employment impact by summing the employment impacts of road construction and changes in MTF funding sources. See Tables A-5 through A-8 in Appendix A.

Limitations and Cautions

This report evaluates the governor's proposal, focusing its quantitative analysis on the proposed $1.4 billion increase in annual spending on roads. We do not attempt to independently evaluate whether this amount is required to prevent further deterioration of the state's roads, though we note that others have supported this level of investment. We do not attempt to evaluate the specific level of road quality that could be achieved at this or other levels of additional spending.

The economic analysis in this report does not attempt to quantify the benefits to Michigan industries of improved road conditions, though reduced repair costs and delays could improve the state's competitiveness in attracting and retaining business to the state by lowering certain operating costs.

This report does consider the following factors in the economic impact analysis:

- The effect on road conditions and competitiveness of increasing road funding even more than the amount proposed by the governor.
- The impact of traffic congestion caused by any increase in construction and maintenance activity associated with the proposal.
- Whether more effective or efficient road construction and repair techniques are a feasible alternative to the state's current practices.
- Any modifications or extensions to the governor's proposal to address structural weaknesses in relying on fuel taxes to fund road maintenance should the state see increased use of electric passenger vehicles.
- The effects of local governments' ability to raise and spend funds on roads.
- The effects of any tax proposal on the after-tax income distribution in the state.

The employment impact analysis finds a strong result in favor of using increased MTF funds for road construction, even without quantifying the economic benefits of having improved road infrastructure. This result relies primar-

ily on two aspects of the analysis. First, construction is an activity that has a higher economic multiplier than does the alternative spending by households and businesses. Second, a portion of the funds that go to the MTF through motor fuel taxes and motor vehicle registration fees would otherwise be spent outside the state by businesses and individuals. This logic would appear to apply to many forms of state government spending paid for by taxes, and indeed it may. Nevertheless, there are several aspects of road construction in particular that may not apply to other, apparently analogous proposals for tax-funded expenditures, including transportation-related proposals.

- First, funding for the construction and maintenance of Michigan's road infrastructure has constitutional, statutory, and precedential protections that should give Michigan's citizens great confidence that the money allocated to the MTF is spent as intended. Any new legislation re-directing funds or increasing rates would need to include specific language ensuring that these funds would go into the MTF and would be spent as intended.
- Second, road construction and maintenance applies to an existing, mature transportation network that has predictable costs and proven patterns of use. This report assumes that the asset management system of road quality assessment and monitoring would be used.

Third, the state's road system (especially the trunkline roads) support rather than disrupt existing commerce. Some other proposals for increased government spending would have neutral or even negative effects on commerce in the state.

Transportation Asset Management Council

The Transportation Asset Management Council of Michigan was created by the to collect data and report analysis on Michigan's transportation infrastructure to the Michigan Legislature and State Transportation Commission. Act 51 requires that each road agency in the state report acquisition and use of roads funds to the Council. One major part of the Council's job is to maintain a database of Michigan's road quality and conditions. The Council is made up of representatives from agencies that either oversee roads or are responsible for road funding.

Table A-1: Increase in Funds for the Michigan Transportation Fund, Baseline and Proposed New Funding Level for FY 2011-12

**All dollar figures are shown in million of 2011 U.S. Dollars*

	Notes:	Baseline	Proposed New Funing Level
MTF Additional State-Source Revenue Scenarios			
Total Additional MTF Revenue*	(1)	$ -	$ 1,377.13
Allocation of Additional MTF Revenue by Road Type			
Proportion going to State Trunkline Freeways	(2)		27%
Proportion going to State Trunkline Highways			22%
Proportion going to Remainder of Federal-Aid Eligible Roads			33%
Proportion going to non-Federal-Aid Roads that are Paved			18%
memo: Total Proportion going to Road Types (NOT Road Agencies)			
Proportion of additional funds used to construct, maintain, and preserve roads	(3)		100%
MTF Revenue to Road Agencies used to construct, maintain, and preserve roads			
State Trunkline Fund Freeway expenditures on construction and maintenance			$ 371.83
State Trunkline Fund Highways expenditures on construction and maintenance			$ 302.97
Non-Trunkline Federal-Aid Road expenditures on construction and maintenance			$ 454.45
Non-Federal-Aid Paved Road expenditures on construction and maintenance			$ 247.88
Total: Additional MTF funds to Road Types used to construct and maintain roads.			$ 1,377.13
memo: Additional MTF funds will be allocated based on road type rather than by agency.			
Summary: Total MTF Allocation For Additional Maintenance Using Asset Management			
MTF funds for each road type used to maintain, rehabilitate, and reconstruct Michigan's roads.			$ 1,377.13
Total - Additional MTF Revenues			$ 1,377.13

Notes:

* *All dollar figures are in millions of 2011 dollars*

(1) *The "Baseline" scenario is the current funding scenario for the MTF. This does add any additional funds to the MTF .*

(2) *AEG analysis of average additional funds going to each type of road road. The analysis is based on data presented in "Michigan's Roads Crisis", from the Work Group on Transportation Funding of the House of Representatives. Data presented for each road type is the percentage of total additional funds going to each road type.*

(3) *All additional MTF funds will go toward road maintenance, rehabilitation, and reconstruction.*

Analysis: Anderson Economic Group, LLC

Table A-2: Example Scenarios for Achieving Proposed New Funding Level

**All dollar figures are shown in million of 2011 U.S. Dollars*

	Notes	Example Scenarios with a Primary Single Source		Plausible Multi-Source Scenarios	
		Scenario 1	Scenario 2	Scenario 3	Scenario 4
Total Additional Funds		$ 1,377.13	$ 1,377.13	$ 1,377.13	$ 1,377.13
Sources of Additional Funds					
Increased Registration Fee	(1)	100%	0%	50%	31%
New Wholesale Fuel Tax	(2)	0%	100%	50%	31%
Flat-Rate Fuel Tax	(3)	0%	0%	0%	38%
Total Amount of Additional Funds Contributed					
Registration Fee	(1)	$ 1,377.13	$ -	$ 688.57	$ 429.36
Wholesale Fuel Tax	(2)	$ -	$ 1,377.13	$ 688.57	$ 429.36
Flat-Rate Fuel Tax	(3)	$ -	$ -	$ -	$ 518.40
Per Unit or Percentage Tax Levy *(true increase value, not in millions of dollars)*					
Registration Fee *(average per vehicle)*	(1)	$ 288.35	$ -	$ 200.01	$ 166.75
New Wholesale Fuel Tax *(% of wholesale price)*	(2)	6.98%	16.98%	11.98%	6.50%
Flat-Rate Fuel Tax	(3)	$ -	$ -	$ -	$ 0.10
Increase from Revenue Neutral Tax Rate *(true increase value, not in millions of dollars)*					
Registration Fee	(1)	$ 176.69	$ -	$ 88.35	$ 55.09
New Wholesale Fuel Tax	(2)	0%	10.00%	5.00%	-0.48%
Flat-Rate Fuel Tax	(3)	$ -	$ -	$ -	$ 0.10

Notes:

(1) The increased registration tax would include a measure to remove the 3-year value deduction from the tax calcuation. The amount presented as an increase if the overall average increase for a Michigan vehicle. The actual increase amount is dependent upon the value of each vehicle registered.

(2) Explain fuel tax (either business or per gallon)

(3) The example of a dedicated sales tax is for reference point only. This option would be the most difficult to institute because it requires extensive constitutional changes.

Analysis: Anderson Economic Group, LLC

Table A-3: Assumed Use of MTF Revenue Source Funds by Households and Businesses if Taxes Are Not Levied

**All dollar figures are shown in million of 2011 U.S. Dollars*

	Notes:	Scenario 1: Registration Fees	Scenario 2: Fuel Taxes	Scenario 3: Half Registration Fee and Half Gas Tax	Scenario 4: 10 cent Fuel Tax, Wholesale Fuel Tax, and Registration Fee Increase
Spent by Households in Michigan	(1)	81.4%	67.60%	75%	72%
Spent by Businesses in Michigan	(2)	6.4%	17.30%	12%	14%
Spent outside of Michigan and by Non-Michiganders	(3)	12.2%	15.10%	14%	14%
Totals		100%	100%	100%	100%

Notes:

(1) *The percentage of funds that would be spent by households without tax increases on vehicle registration and motor fuel is calculated by removing the percentage of household out-of-state spending (13%) then multiplying the new total by the proportion of all registration fees paid by households. The same method is used for fuel taxes, and sales taxes. For example scenario 4 (half registration fee and half motor fuel tax increase) weights are applied based on the overall proportion of registration fees and gas taxes paid.*

(2) *We calculate the percentage of of funds that would be spent by businesses without tax increases on vehicle registration and motor fuels by assuming that the percentage of each tax currently paid by businesses is the same proportion that would be used otherwise. For example, businesses contribute approximately 6.4% of registration taxes paid. Therefore, we assume that this same percentage of funds is what businesses would have spent in Michigan if we were not to increase vehicle registration taxes.*

(3) *AEG analysis of the Consumer Expenditure Survey and using expert judgment leads us to believe that about 13% of all Michigan household expenditures are make out of state. This percentage fluctuates between approximately 12% and 15% depending on the tax affected. We also assume that most funds spent outside the state are spent by households.*

Analysis: Anderson Economic Group, LLC

Table A-4: Alternative Uses of MTF Funding by Households and Business

**All dollar figures are shown in million of 2011 U.S. Dollars*

	Notes:		Baseline		Scenario 1		Scenario 2		Scenario 3		Scenario 4
Counterfactual Allocation of MTF Funds - Comparison to "Baseline" Funding Level	(1)										
Total MTF Revenue*	(2)		$ -		$ 1,377.13		$ 1,377.13		$ 1,377.13		$ 1,377.13
MTF Revenue - Increment compared to "Baseline" funding level	(3)		$ -		$ 1,377.13		$ 1,377.13		$ 1,377.13		$ 1,377.13
Otherwise Spent In Michigan by Households		*x 65%*	$ -	*x 81%*	$ 1,121.05	*x 68%*	$ 930.98	*x 75%*	$ 1,026.01	*x 72%*	$ 989.90
Otherwise Spent in Michigan by Business		*x 20%*	$ -	*x 6%*	$ 88.57	*x 17%*	$ 238.18	*x 12%*	$ 163.37	*x 14%*	$ 191.80
Otherwise Spent Outside Michigan		*x 15%*	$ -	*x 12%*	$ 167.51	*x 15%*	$ 207.97	*x 14%*	$ 187.74	*x 14%*	$ 195.43
MTF Revenue to Road Agencies used to construct, maintain, and preserve roads	(2)										
State Trunkline Fund Freeway expenditures on construction and maintenance			$ -		$ 371.83		$ 371.83		$ 371.83		$ 371.83
State Trunkline Fund Highways expenditures on construction and maintenance			$ -		$ 302.97		$ 302.97		$ 302.97		$ 302.97
Non-Trunkline Federal-Aid Road expenditures on construction and maintenance			$ -		$ 454.45		$ 454.45		$ 454.45		$ 454.45
Non-Federal-Aid Paved Road expenditures on construction and maintenance			$ -		$ 247.88		$ 247.88		$ 247.88		$ 247.88
Total: Additional MTF funds to Road Types used to construct and maintain roads.			$ -		$ 1,377.13		$ 1,377.13		$ 1,377.13		$ 1,377.13

Notes:

(1) This section desscribes what we assume "would have happened" to MTF funding if the associated taxes and feed were not levied to raise additional transportation funding. This analysis assumes different percentages of spending from households, businesses, and outside Michigan depending on the scenario. Each funding scenario gathers different levels of funding from each source. Therefore, the impact on households, businesses, and outside Michigan is different for each scenario.

(2) See Table A-1.

(3) Proportion otherwise spent in Michigan by households and business, and outside Michigan. Percentages of each revenue source attributable to households, businesses, and out-of-state are estimated by AEG using professional judgement. See Table A-3 for values and Appendix A: Methodology.

Analysis: Anderson Economic Group, LLC

Table A-5: Employment Impact of Additional Funding Example Scenario 1

**All dollar figures are shown in million of 2011 U.S. Dollars*

Scenario 1: This example show the economic impact of increasing motor vehicle title and registration taxes to fund $1.4 billion additional MTF dollars.

	Impact of "Scenario 1" Compared to the "Baseline"		Employment Multipliers (Employment per $1 million in spending)[a]		Employment Impact of Changes in Spending[b]	
MTF Revenues from Taxes and Fees - Increment Above (Below) "Baseline" Scenario (From Table 2)						
Otherwise Spent In Michigan by Households	$	(1,121.05)	x	11.0501	=	(12,387.69)
Otherwise Spent in Michigan by Business	$	(88.57)	x	14.5	=	(1,285.68)
Otherwise Spent Outside Michigan	$	(167.51)	x	0	=	-
Subtotal: Impact of Lower Taxes and Fees						(13,673)
MTF Spending on Road Construction and Maintenance, Increment Above "Baseline" Scenario (From Table 2)						
State Trunkline Fund Freeway expenditures on construction and maintenance	$	371.83	x	18.1191	=	6,737.14
State Trunkline Fund Highways expenditures on construction and maintenance	$	302.97	x	18.1191	=	5,489.52
Non-Trunkline Federal-Aid Road expenditures on construction and maintenance	$	454.45	x	18.1191	=	8,234.28
Non-Federal-Aid Paved Road expenditures on construction and maintenance	$	247.88	x	18.1191	=	4,491.42
Total: Additional MTF funds to Road Types used to construct and maintain roads.	$	1,377.13				24,952
Total Impact on Michigan Employment From Changes in Private Spending and Road Investment						11,279

Notes:

(a) Economic impact multipliers from U.S. Commerce Department's RIMS II Input-Output multiplier series for Michigan, 2008. Multipliers are specific to household spending and construction industries. Michigan business spending is otherwise assumed to be spent is a few select industries. See Appendix A: Methodology for details on this multiplier.

(b) Change in employment reflects direct and indirect employment caused by changes in spending by Michigan households, businesses, and the state government.

Analysis: Anderson Economic Group, LLC

Table A-6: Employment Impact of Additional Funding Example Scenario 2

**All dollar figures are shown in million of 2011 U.S. Dollars*

Scenario 3: This scenario shows the economic impact of shifting from a per gallon (excise) motor fuel tax to a percentage (ad valorum) wholesale fuel tax and increasing the tax to raise $1.4 billion additional MTF dollars.

	Impact of "Scenario 2" Compared to the "Baseline"		Employment Multipliers (Employment per $1 million in spending)[a]	Employment Impact of Changes in Spending[b]	
MTF Revenues from Taxes and Fees - Increment Above (Below) "Baseline" Scenario (From Table 2)					
Otherwise Spent In Michigan by Households	$ (930.98)	x	11.0501 =	(10,287.44)	
Otherwise Spent in Michigan by Business	$ (238.18)	x	14.5 =	(3,457.43)	
Otherwise Spent Outside Michigan	$ (207.97)	x	0 =	-	
Subtotal: Impact of Motor Fuel Tax Shift and Increase					(13,745)
MTF Spending on Road Construction and Maintenance, Increment Above "Baseline" Scenario (From Table 2)					
State Trunkline Fund Freeway expenditures on construction and maintenance	$ 371.83	x	18.1191 =	6,737.14	
State Trunkline Fund Highways expenditures on construction and maintenance	$ 302.97	x	18.1191 =	5,489.52	
Non-Trunkline Federal-Aid Road expenditures on construction and maintenance	$ 454.45	x	18.1191 =	8,234.28	
Non-Federal-Aid Paved Road expenditures on construction and maintenance	$ 247.88	x	18.1191 =	4,491.42	
Total: Additional MTF funds to Road Types used to construct and maintain roads.	$ 1,377.13				24,952
Total Impact on Michigan Employment From Changes in Private Spending and Road Investment					11,207

Notes:

(a) Economic impact multipliers from U.S. Commerce Department's RIMS II Input-Output multiplier series for Michigan, 2008. Multipliers are specific to household spending and construction industries. Michigan business spending is otherwise assumed to be spent is a few select industries. See Appendix A: Methodology for details on this multiplier.

(b) Change in employment reflects direct and indirect employment caused by changes in spending by Michigan households, businesses, and the state government.

Analysis: Anderson Economic Group, LLC

Table A-7: Employment Impact of Additional Funding Example Scenario 3

**All dollar figures are shown in million of 2011 U.S. Dollars*

Scenario 3: This scenario assumes that about $700 million (half of additional MTF funds) will come from increased fuel taxes and half will come from increased registration taxes.

	Impact of "Scenario 3" Compared to the "Baseline"		Employment Multipliers (Employment per $1 million in spending)[a]		Employment Impact of Changes in Spending[b]	
MTF Revenues from Taxes and Fees - Increment Above (Below) "Baseline" Scenario (From Table 2)						
Otherwise Spent In Michigan by Households	$	(1,026.01) x	11.0501	=	(11,337.56)	
Otherwise Spent in Michigan by Business	$	(163.37) x	14.5	=	(2,371.55)	
Otherwise Spent Outside Michigan	$	(187.74) x	0	=	-	
Subtotal: Impact of Lower Taxes and Fees						(13,709)
MTF Spending on Road Construction and Maintenance, Increment Above "Baseline" Scenario (From Table 2)						
State Trunkline Fund Freeway expenditures on construction and maintenance	$	371.83 x	18.1191	=	6,737.14	
State Trunkline Fund Highways expenditures on construction and maintenance	$	302.97 x	18.1191	=	5,489.52	
Non-Trunkline Federal-Aid Road expenditures on construction and maintenance	$	454.45 x	18.1191	=	8,234.28	
Non-Federal-Aid Paved Road expenditures on construction and maintenance	$	247.88 x	18.1191	=	4,491.42	
Total: Additional MTF funds to Road Types used to construct and maintain roads.	$	1,377.13				24,952
Total Impact on Michigan Employment From Changes in Private Spending and Road Investment						**11,243**

Notes:

(a) Economic impact multipliers from U.S. Commerce Department's RIMS II Input-Output multiplier series for Michigan, 2008. Multipliers are specific to household spending and construction industries. Michigan business spending is otherwise assumed to be spent is a few select industries. See Appendix A: Methodology for details on this multiplier.

(b) Change in employment reflects direct and indirect employment caused by changes in spending by Michigan households, businesses, and the state government.

Analysis: Anderson Economic Group, LLC

Table A-8: Employment Impact of Additional Funding Example Scenario 4

**All dollar figures are shown in million of 2011 U.S. Dollars*

Scenario 4: This scenario assumes that Michigan will keep a flat rate fuel tax for both diesel and gasoline at 10 cents per gallon. The remaining MTF additional funds will be gathered from a wholesale fuel tax and increased registration fees. This is equivalent to 69% of additional funds coming from fuel taxes and 31% from registration fees.

	Impact of "Scenario 4" Compared to the "Baseline"		Employment Multipliers (Employment per $1 million in spending)[a]		Employment Impact of Changes in Spending[b]	
MTF Revenues from Taxes and Fees - Increment Above (Below) "Baseline" Scenario (From Table 2)						
Otherwise Spent In Michigan by Households	$	(989.90) x	11.0501 =		(10,938.51)	
Otherwise Spent in Michigan by Business	$	(191.80) x	14.5 =		(2,784.19)	
Otherwise Spent Outside Michigan	$	(195.43) x	0 =		-	
Subtotal: Impact of Lower Taxes and Fees						(13,723)
MTF Spending on Road Construction and Maintenance, Increment Above "Baseline" Scenario (From Table 2)						
State Trunkline Fund Freeway expenditures on construction and maintenance	$	371.83 x	18.1191 =		6,737.14	
State Trunkline Fund Highways expenditures on construction and maintenance	$	302.97 x	18.1191 =		5,489.52	
Non-Trunkline Federal-Aid Road expenditures on construction and maintenance	$	454.45 x	18.1191 =		8,234.28	
Non-Federal-Aid Paved Road expenditures on construction and maintenance	$	247.88 x	18.1191 =		4,491.42	
Total: Additional MTF funds to Road Types used to construct and maintain roads.	$	1,377.13				24,952
Total Impact on Michigan Employment From Changes in Private Spending and Road Investment						11,230

Notes:

(a) Economic impact multipliers from U.S. Commerce Department's RIMS II Input-Output multiplier series for Michigan, 2008. Multipliers are specific to household spending and construction industries. Michigan business spending is otherwise assumed to be spent is a few select industries. See Appendix A: Methodology for details on this multiplier.

(b) Change in employment reflects direct and indirect employment caused by changes in spending by Michigan households, businesses, and the state government.

Analysis: Anderson Economic Group, LLC

ROAD INFRASTRUCTURE'S IMPACT ON MICHIGAN HOUSEHOLDS

In "Additional Benefits of Investing in Transportation Infrastructure" on page 39, we present statistics on crashes where road conditions were involved and our estimates of the cost impact on Michigan households. We provide the sources and calculations for this data in our 2010 report, "Michigan's Roads: The Cost of Doing Nothing and the Rewards of Bold Action."[67] Please see this report for additional details on the benefits of infrastructure to households and businesses.

67. Anderson Economic Group, "Michigan's Roads: The Cost of Doing Nothing and the Rewards of Bold Action," 2010.

Appendix B: About AEG

Anderson Economic Group, LLC was founded in 1996 and today has offices in East Lansing, Michigan and Chicago, Illinois. AEG is a research and consulting firm that specializes in economics, public policy, financial valuation, and market research. AEG's past clients include:

- *Governments* such as the states of Michigan, North Carolina, and Wisconsin; the cities of Detroit, Cincinnati, Norfolk, and Fort Wayne; counties such as Oakland County, Michigan, and Collier County, Florida; and authorities such as the Detroit-Wayne County Port Authority.
- *Corporations* such as GM, Ford, Delphi, Honda, Taubman Centers, The Detroit Lions, PG&E Generating; SBC, Gambrinus, Labatt USA, and InBev USA; Spartan Stores, Nestle, automobile dealers and dealership groups representing Toyota, Honda, Chrysler, Mercedes-Benz, and other brands.
- *Nonprofit organizations* such as Michigan State University, Wayne State University, University of Michigan, Van Andel Institute, the Michigan Manufacturers Association, United Ways of Michigan, Service Employees International Union, Automation Alley, the Michigan Chamber of Commerce, and Detroit Renaissance.

Please visit www.AndersonEconomicGroup.com for more information.

ABOUT THE AUTHORS

This project was completed under the direction of Alex L. Rosaen, a consultant in the firm's public policy, fiscal, and economic analysis practice area. Erin M. Agemy, a senior analyst co-authored this report with Mr. Rosaen. Brief biographical information of the project team follows.

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Mr. Rosaen is a consultant at Anderson Economic Group, working in the Public Policy and Economics practice area. Mr. Rosaen's background is in applied economics and public finance.

Prior to joining Anderson Economic Group, Mr. Rosaen worked for the Office of Retirement Services (part of the Michigan Department of Management and Budget) for the Benefit Plan Design group. He also has worked as a mechanical engineer for Williams International in Walled Lake, MI.

Mr. Rosaen holds a master's in public policy from the Gerald R. Ford School of Public Policy at the University of Michigan. He also has a Master of Science degree and a Bachelor of Science degree in mechanical engineering from the University of Michigan.

Erin A. Grover

Ms. Grover is a Senior Analyst at Anderson Economic Group, working in the Public Policy and Economic Analysis, and Business Valuation practice areas. Her background is in applied economics.

Ms. Grover's recent work consists of several economic and fiscal impact analyses of counties and business ventures throughout the U.S.; evaluating policy changes and potential public funding mechanisms; as well as an analysis of the economic contribution research universities make in Michigan. She is also currently contributing to the book *Economics of Business Valuation*, a forthcoming publication of Stanford Press.

Prior to joining AEG, Ms. Grover worked as a contract consultant providing research and detailed data analysis to economic and finance consulting firms in Michigan and Ohio. She was also one of four students selected as a graduate fellow at the Mercatus Center in Arlington, Virginia. While there she contributed to their Gulf Coast Recovery Project, which received the Templeton Freedom Award for Special Achievement. Ms. Grover has also conducted original fieldwork on the political economy of charter schools in New Orleans, which she presented at an international conference for the Association of Private Enterprise Education.

Ms. Grover holds a Masters degree in Economics from George Mason University and a Bachelors of Science degree in Political Economy from Hillsdale College.

Colby W. Spencer

Colby W. Spencer is a Senior Analyst at Anderson Economic Group, working in the Public Policy and Economic Analysis; and Market and Industry practice areas. Ms. Spencer's background is in econometrics, public policy, local government, urban and social policy, and education.

Prior to coming to Anderson Economic Group Ms. Spencer worked with the Michigan Municipal League on the 21st Century Communities project providing consulting services to local governments in Michigan concerning local economic development initiatives. Ms. Spencer held a fellowship at Columbia University as a teaching assistant for Quantitative Analysis and Operations Management. She has also taught in the District of Columbia Public Schools.

Ms. Spencer holds a Bachelor of Science in Education from New York University and a Master of Public Administration from the School of International and Public Affairs at Columbia University.

Appendix C: Revisions

The following revisions have been made to this document since its release in June 2012.

Section	Page	Revision
Executive Summary	p. 4	In Finding 1 we reference MDOT's forecast for poor freeway conditions in Michigan as 25% of roads. We had previously referenced this value incorrectly as 50%.
Section II. Michigan Transportation Infrastructure and Overview of Proposed Policy Change	p. 9	We reference MDOT's forecast for poor freeway conditions in Michigan as 25% of roads. We had previously incorrectly referenced the Transportation Asset Management Council as the source and the value incorrectly as 50%.
	p. 11, 13, 17, and 18	We note that the funding formula for MTF revenues is based primarily on route miles. We previously incorrectly used the term "lane miles" synonymously with route miles.
	p. 13	We added a footnote further explaining the legislative changes to the MTF funding formula found in Act 51 or 1951.
	p.17	The previous version of this report incorrectly stated that local road agencies are not required to use asset management principles for their road projects. This misstatement has been corrected.